

Data and tools for sustaining biodiversity in managed forests



NatureServe.

Healy Hamilton, Ph.D.

Chief Scientist

NatureServe

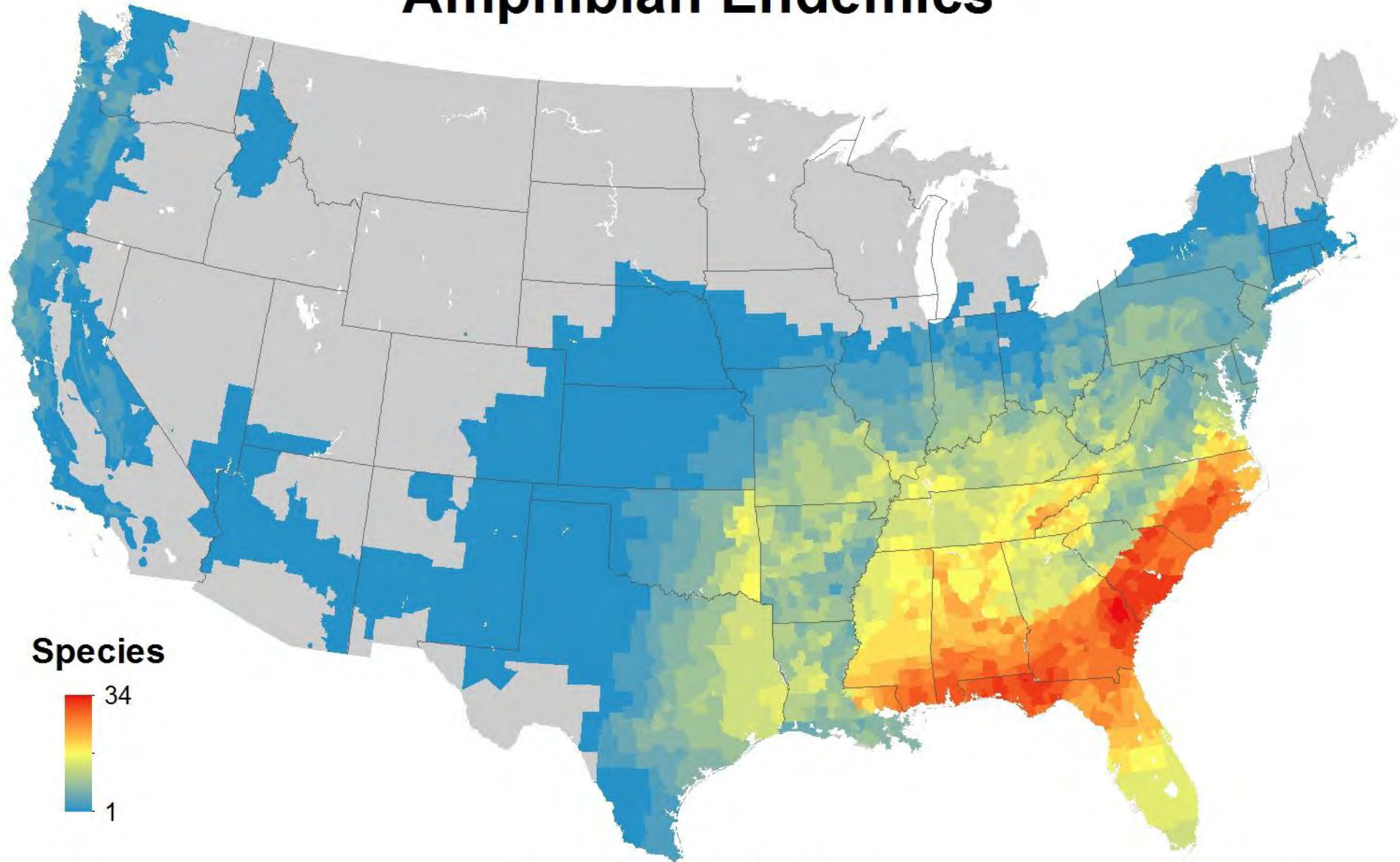
35 Global Biodiversity Hotspots

Very high endemism and very high threat

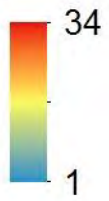


- 1,500 species of vascular plants found nowhere else on Earth
- Loss of at least 70 percent of its primary native vegetation

Amphibian Endemics



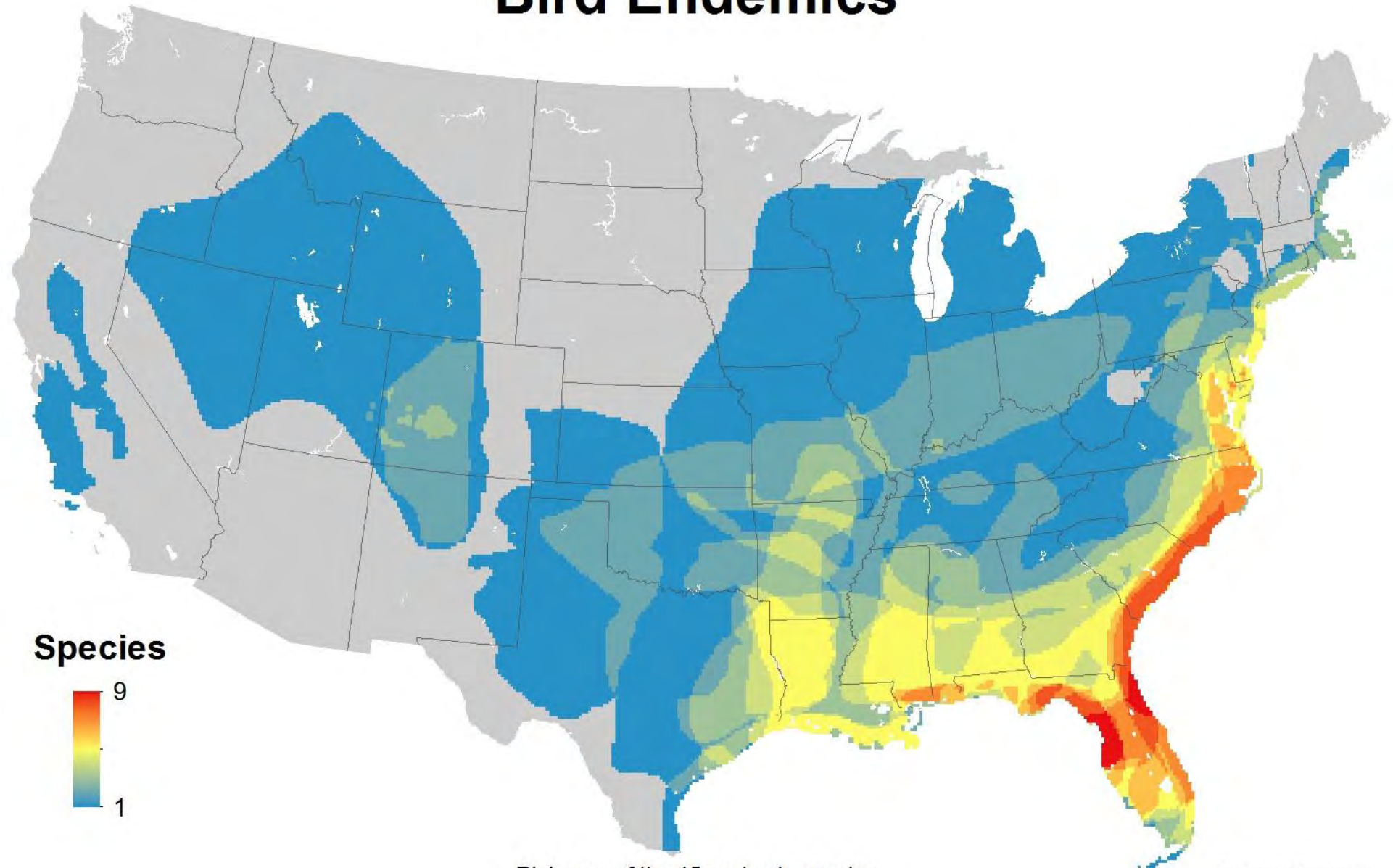
Species



Richness of the 188 endemic species

BiodiversityMapping.org

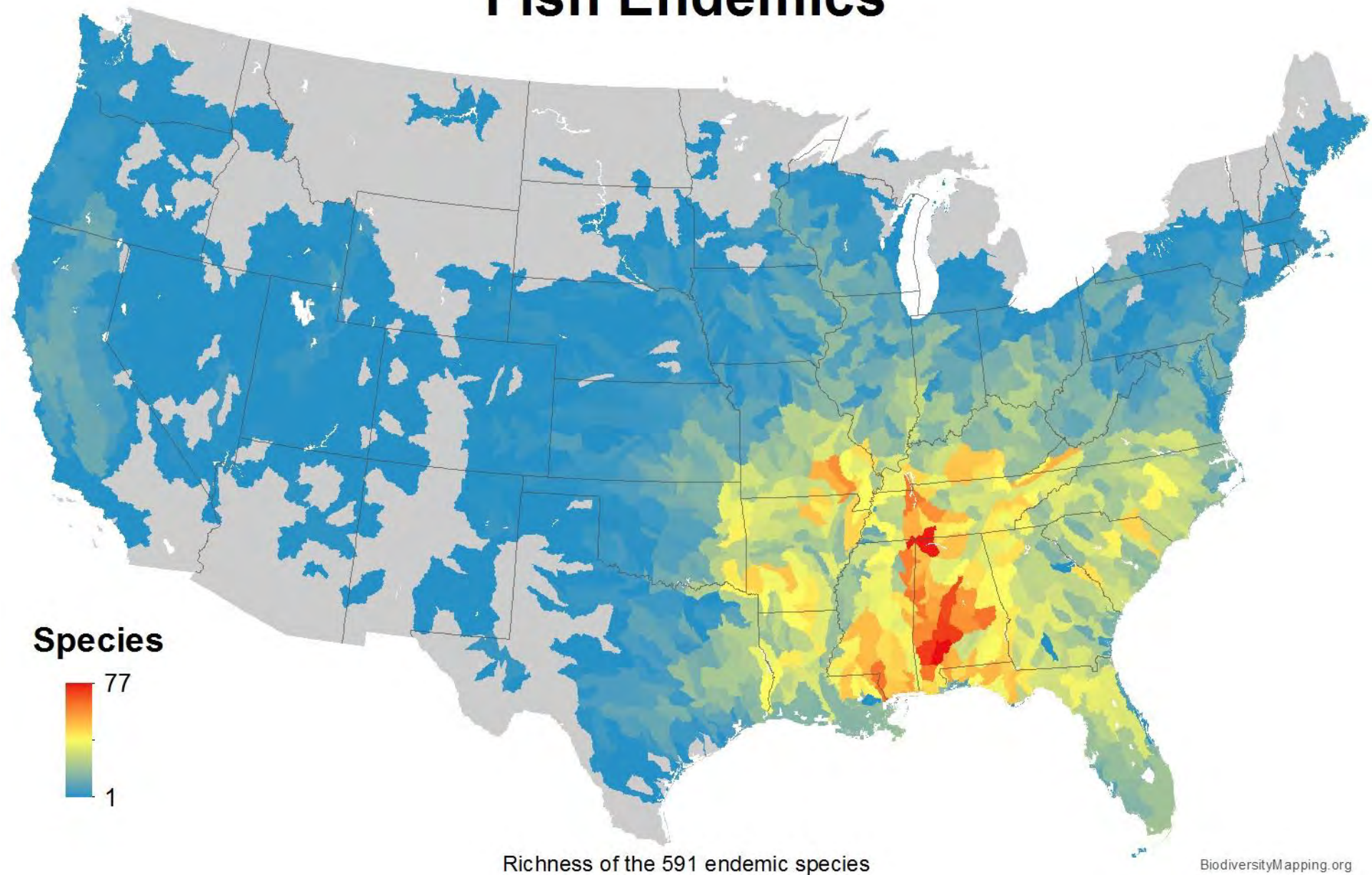
Bird Endemics



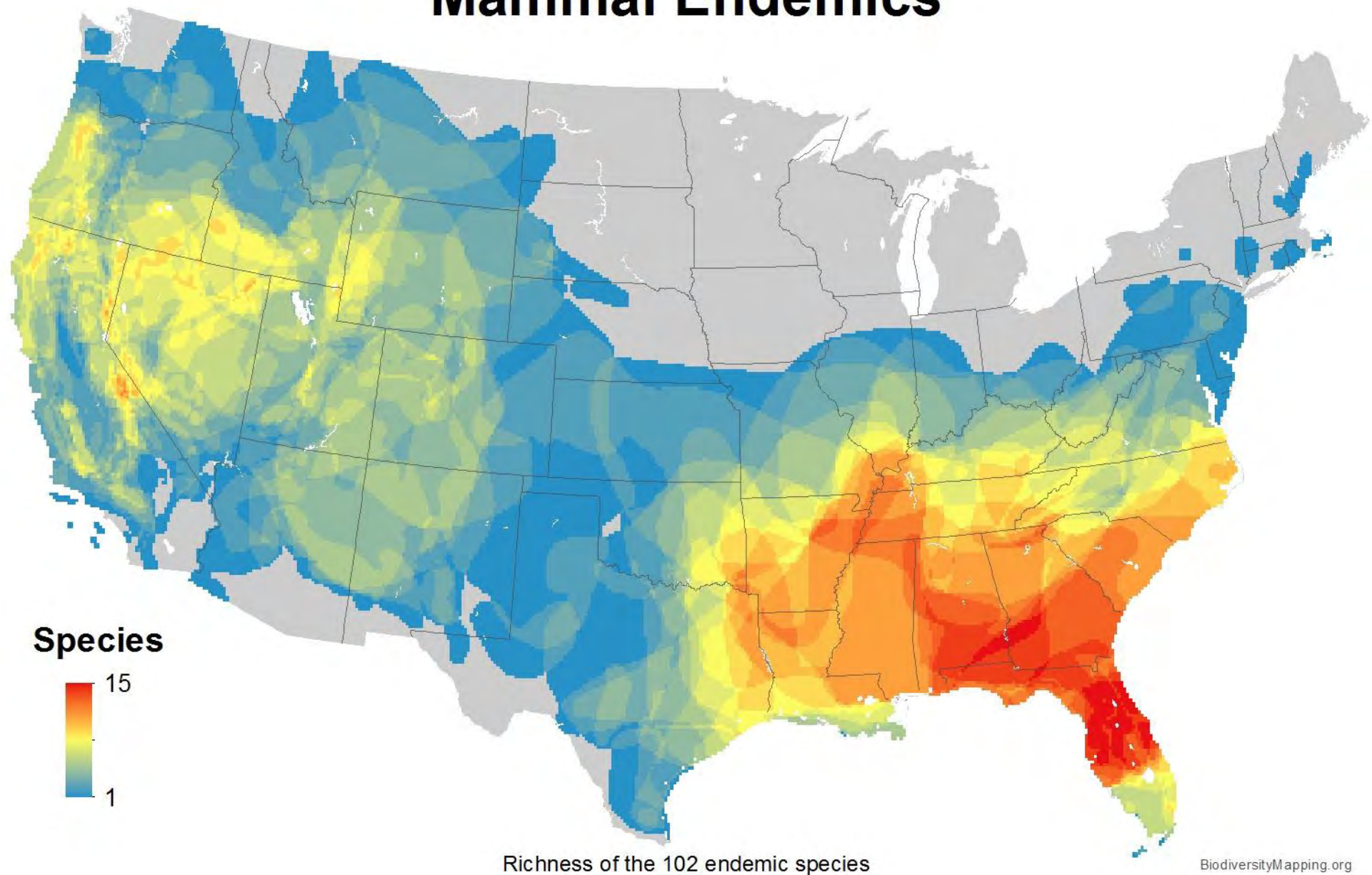
Richness of the 15 endemic species

BiodiversityMapping.org

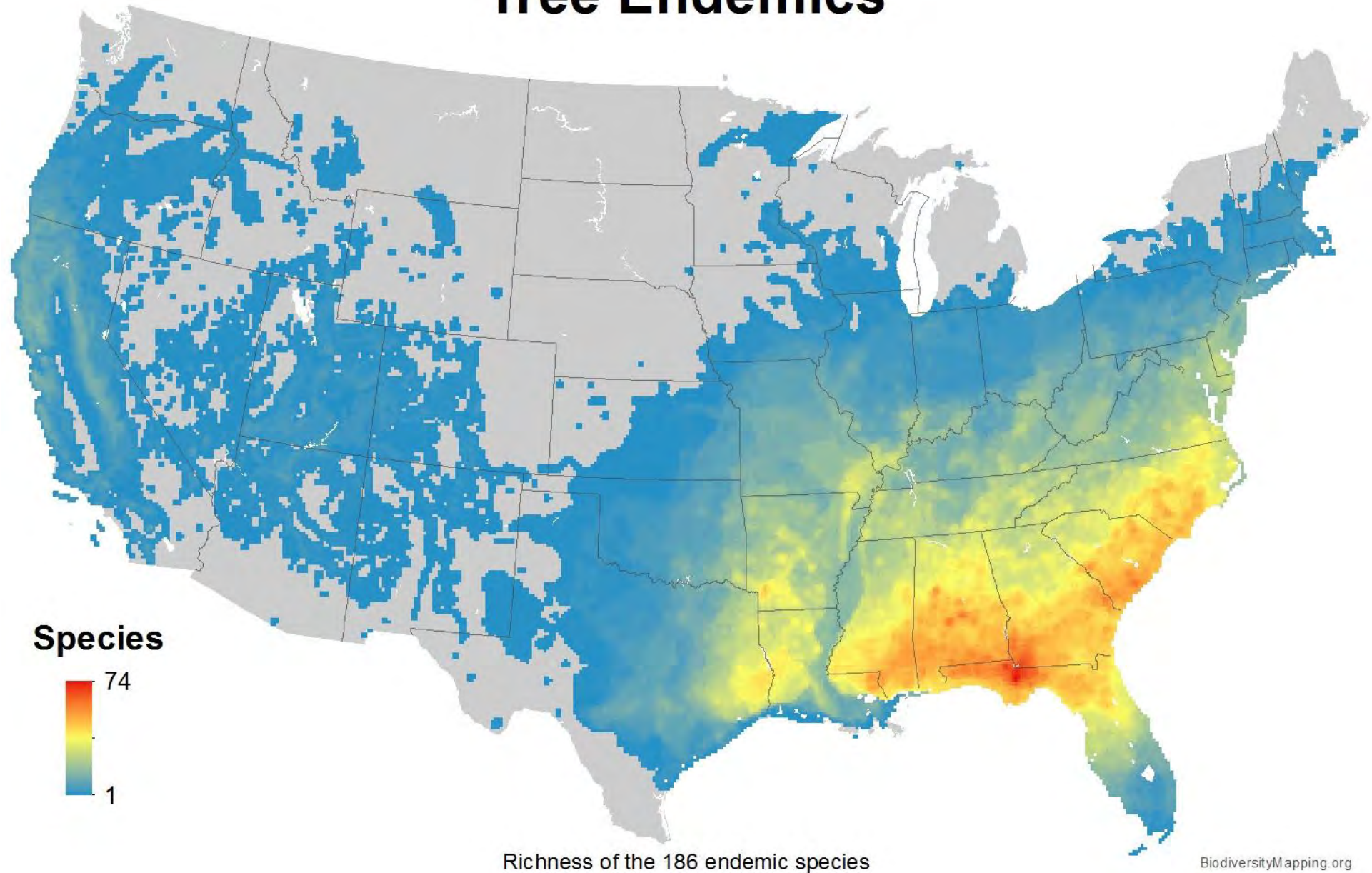
Fish Endemics



Mammal Endemics



Tree Endemics



“This region has long been misunderstood, which is why it was not classified as a biodiversity hotspot until 2016.”



North American Coastal Plain

HCV 2 Landscape-level ecosystems, ecosystem mosaics and IFL

Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes (IFL) that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

Rare, threatened, or endangered ecosystems, habitats or refugia.

Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.

Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc...), identified through engagement with these communities or indigenous peoples.



Box 1: The Six High Conservation Values

HCV 2 Landscape-level ecosystems, ecosystem mosaics and IFL

Large landscape-level ecosystems, ecosystem mosaics and Intact Forest Landscapes (IFL) that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.

HCV 1 Species diversity

Concentrations of biological diversity including endemic species, and rare, threatened or endangered species, that are significant at global, regional or national levels.

HCV 3 Ecosystems and habitats

Rare, threatened, or endangered ecosystems, habitats or refugia.

HCV 4 Ecosystem services

Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.



HCV 5 Community needs

Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc...), identified through engagement with these communities or indigenous peoples.

HCV 6 Cultural values

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

Common Guidance for the IDENTIFICATION of HIGH CONSERVATION VALUES



A good practice guide for identifying HCVs across different ecosystems and production systems

FIRST PUBLISHED ON OCTOBER 2013
AMENDED ON SEPTEMBER 2017





A Global Standard for the Identification of Key Biodiversity Areas

Version 1.0



An umbrella framework that harmonizes existing approaches

Key Biodiversity Areas



+ other elements of biodiversity not considered by existing approaches

Slide courtesy of WCS

KBA Criteria

A. Threatened biodiversity



B. Geographically restricted biodiversity



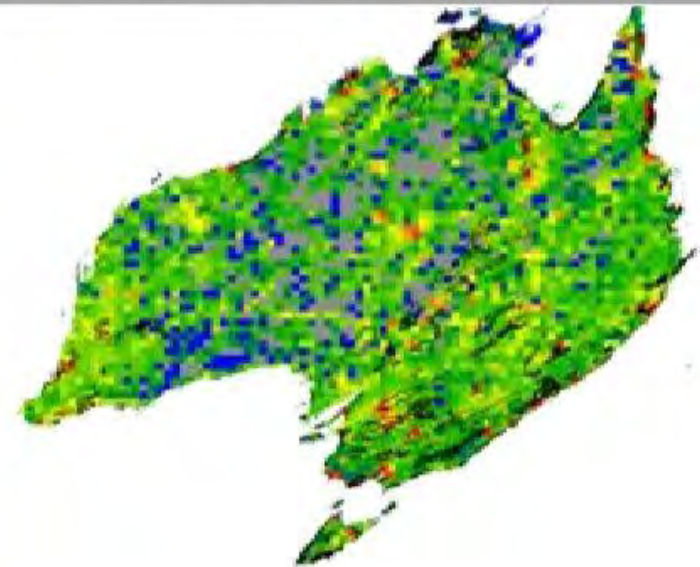
C. Ecological integrity



D. Biological processes



E. Irreplaceability through quantitative analysis



Slide courtesy of WCS

World Database of Key Biodiversity Areas™

Managed by BirdLife International on behalf of the KBA Partnership

Search...



Search ▾

www.keybiodiversityareas.org

out

Business Guidelines

Zoom to country



Randy Browning USFWS



Gopher Tortoise

Gopherus polyphemus

NatureServe Global Status:

Vulnerable (G3)

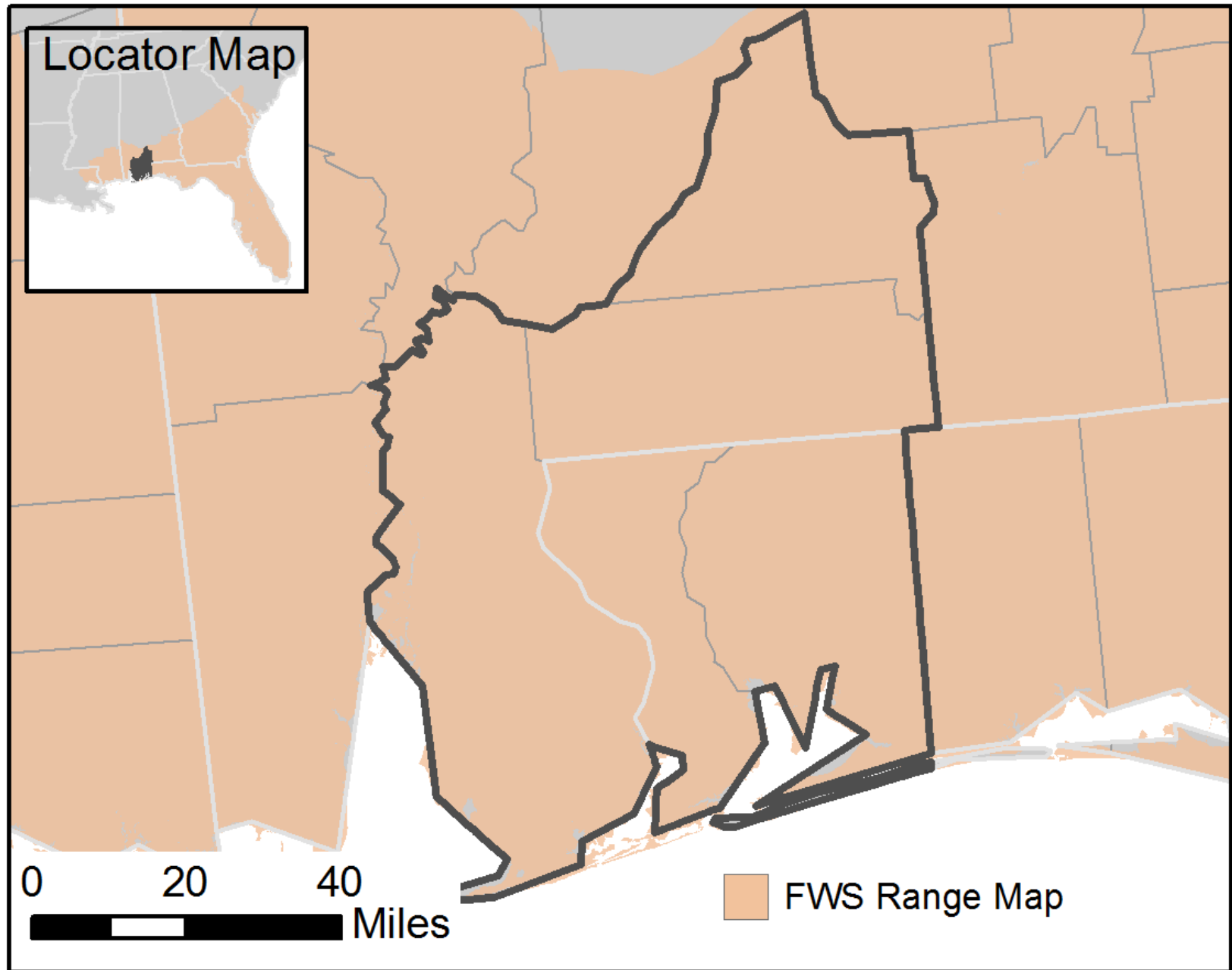
ESA listing:

threatened (west) and candidate (east)

Gopher Tortoise

Range Map

U.S. Fish & Wildlife Service



Source: USFWS ECOS Range Map



Gopher Tortoise

Gopherus polyphemus

NatureServe Global Status:

Vulnerable (G3)

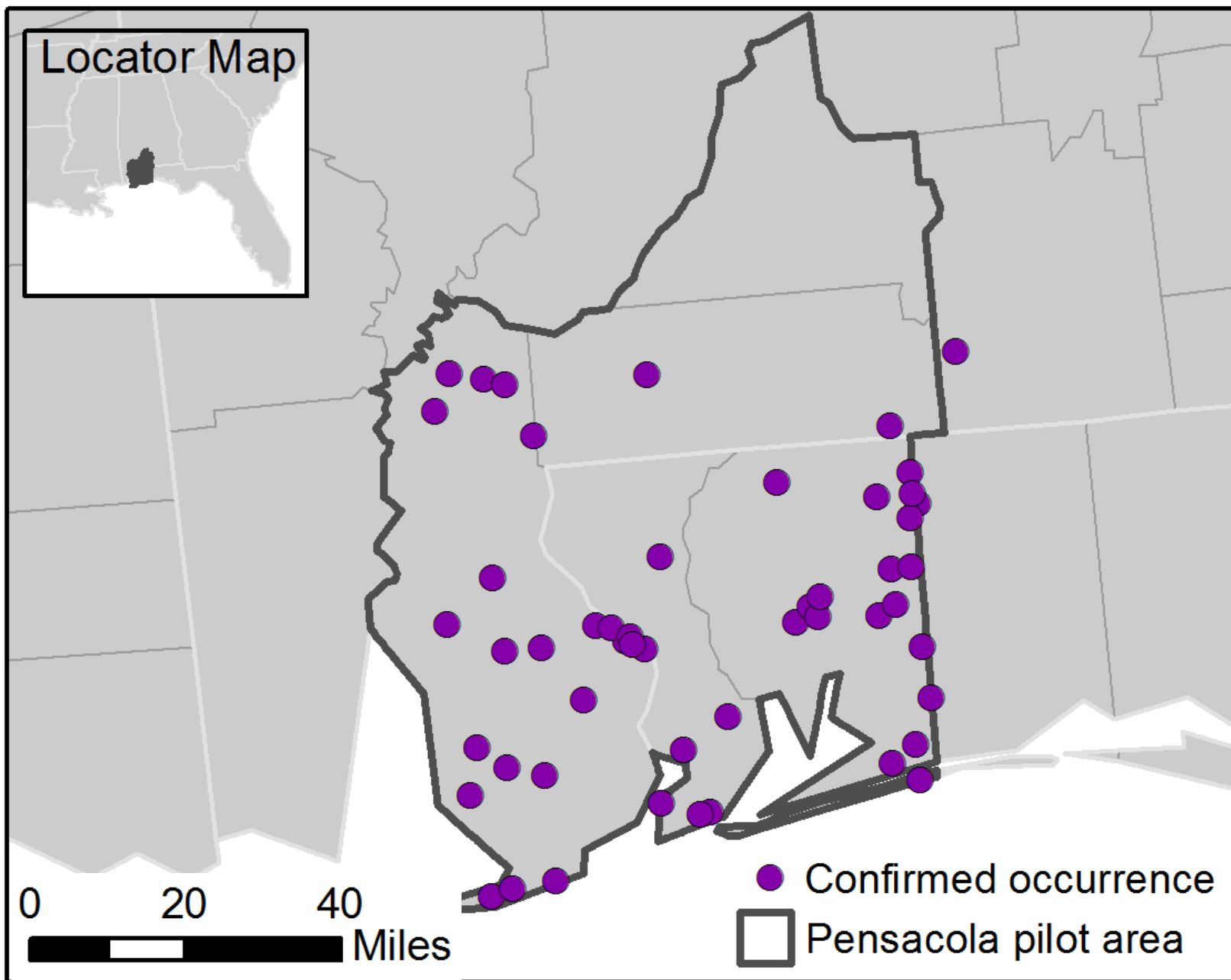
ESA listing:

threatened (west) and candidate (east)

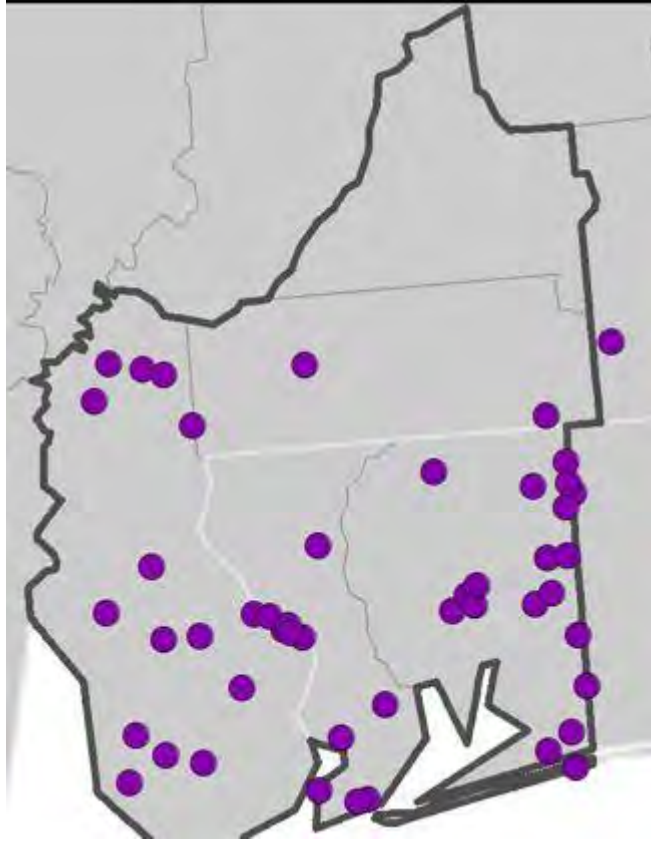
Gopher Tortoise

Confirmed Presence

Validated field observations



Source: NatureServe Network Element Occurrences

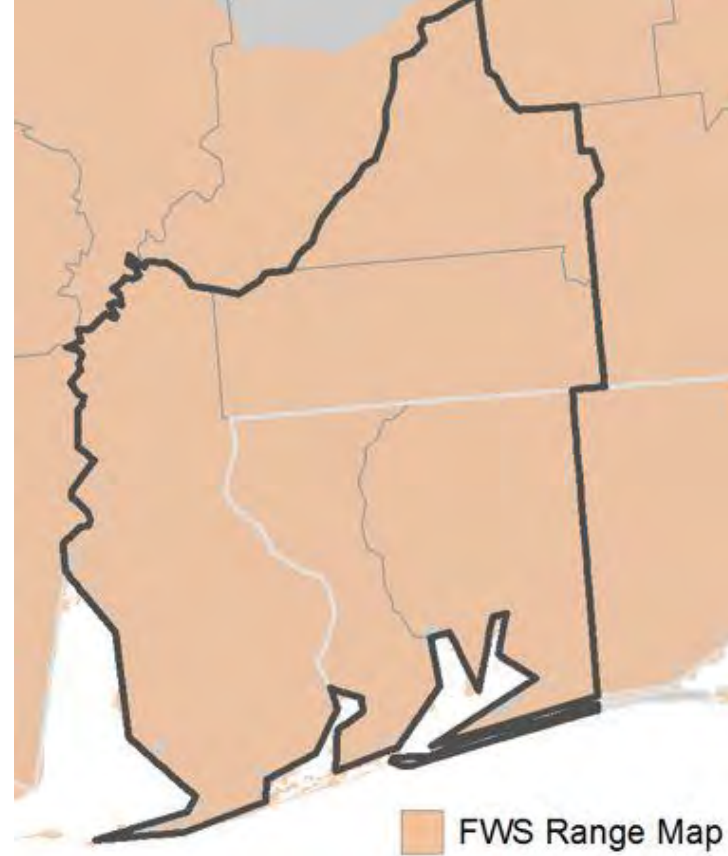


When observations are used
as a distribution map:

Underpredicts occupied area

Overpredicts unoccupied area

Dependent on intensity of sampling effort



When a coarse range map is used
as a distribution map:

Overpredict occupied area

Underpredicts unoccupied area

Difficult to replicate; subjective



Gopher Tortoise

Gopherus polyphemus

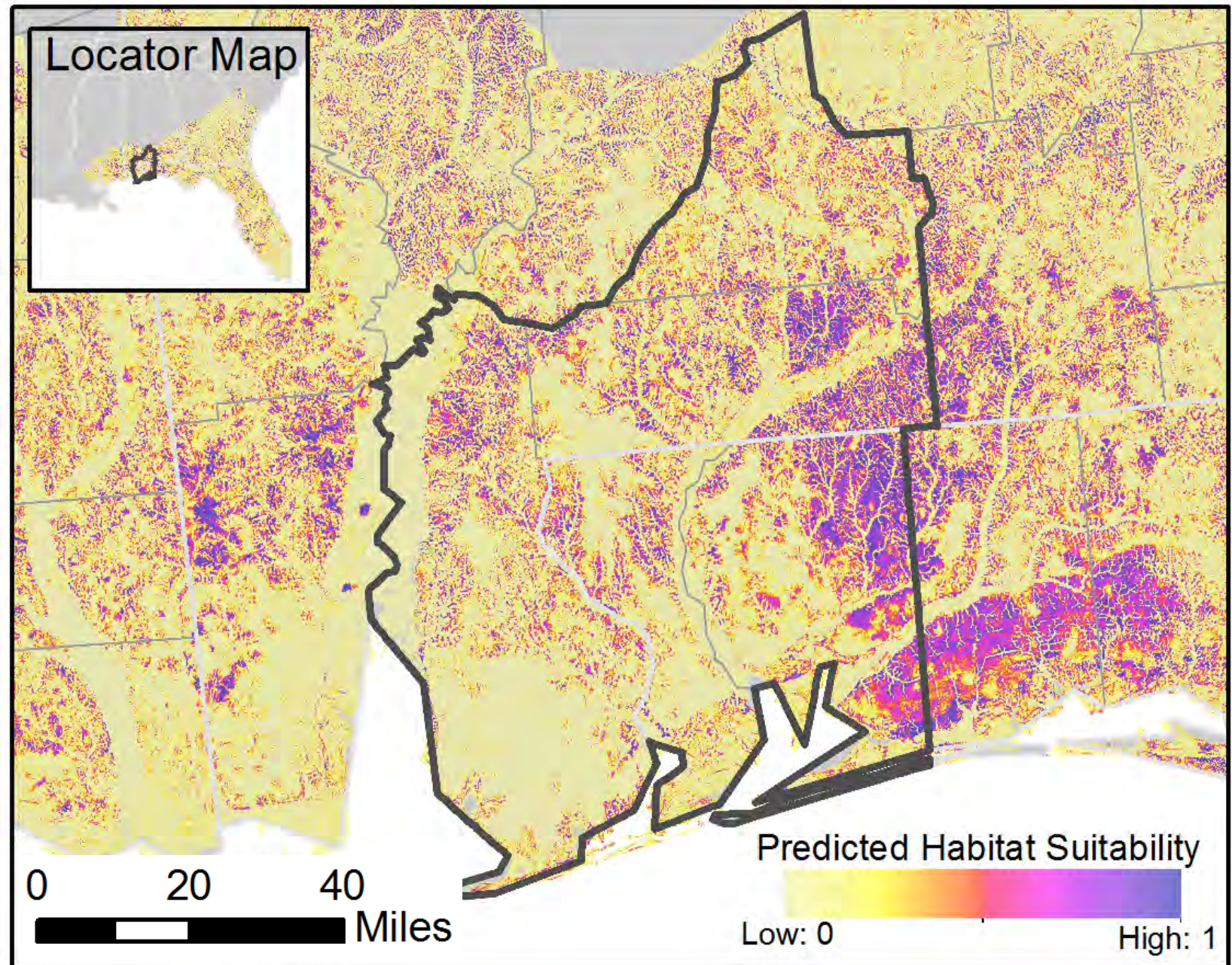
NatureServe Global Status:

Vulnerable (G3)

ESA listing:

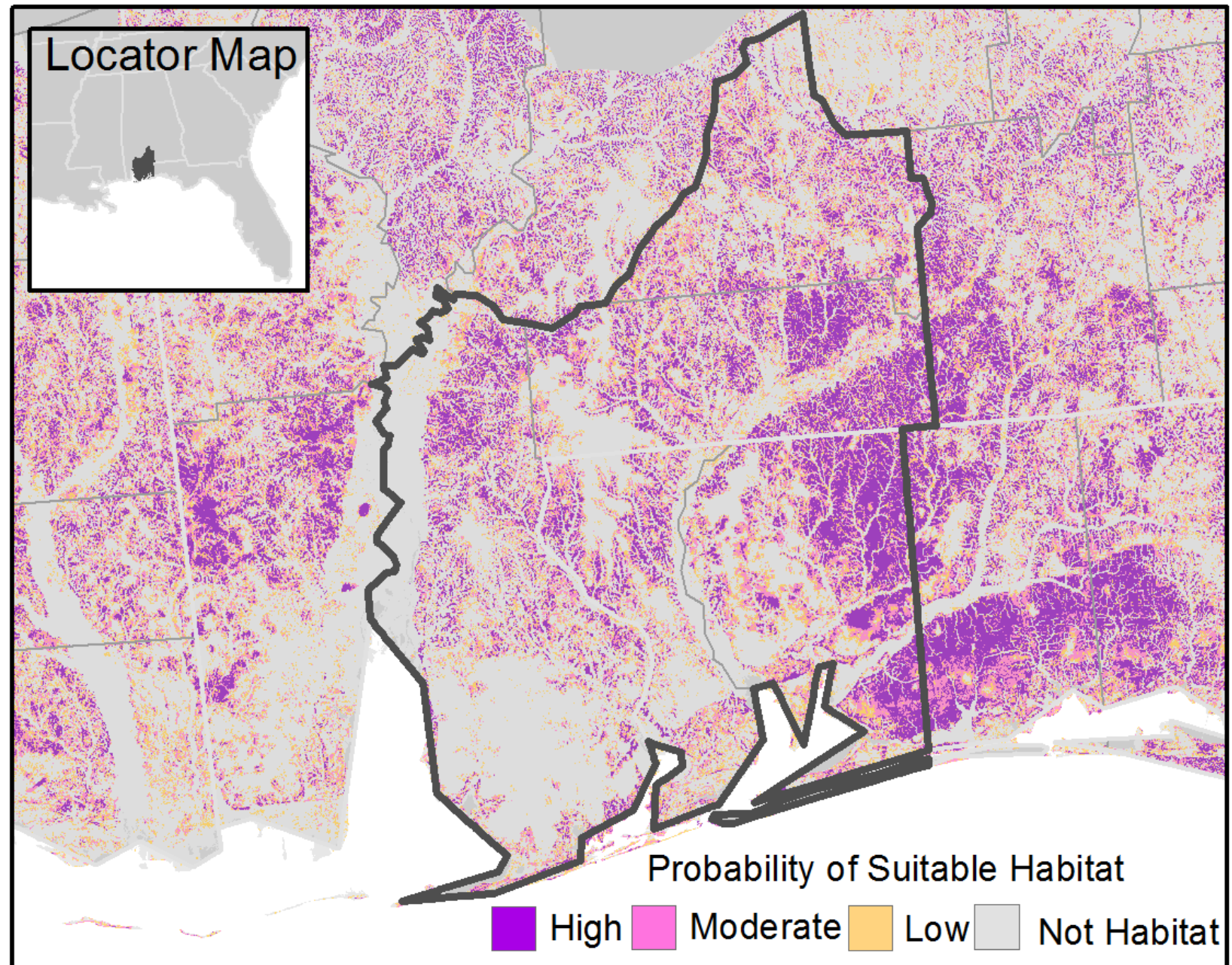
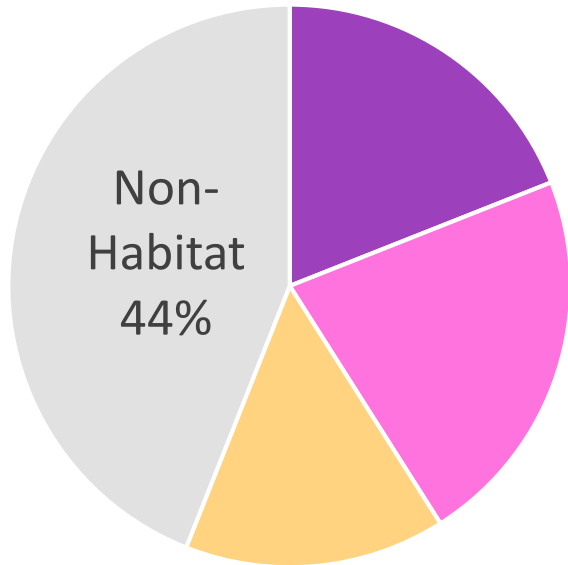
threatened (west) and candidate (east)

Gopher Tortoise Species Distribution Model



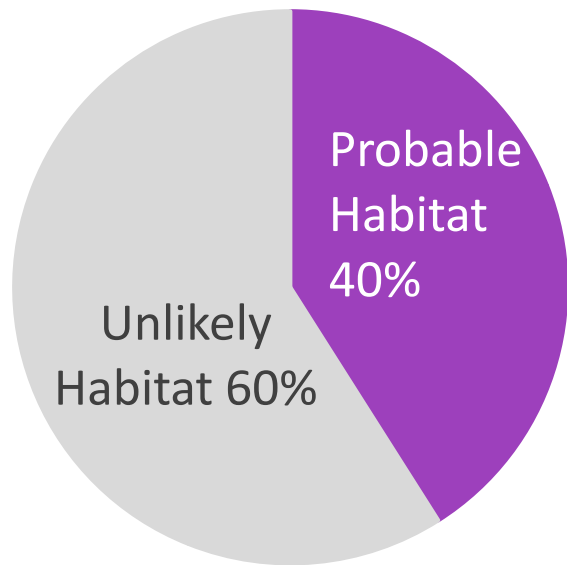


Gopher Tortoise Species Distribution Model

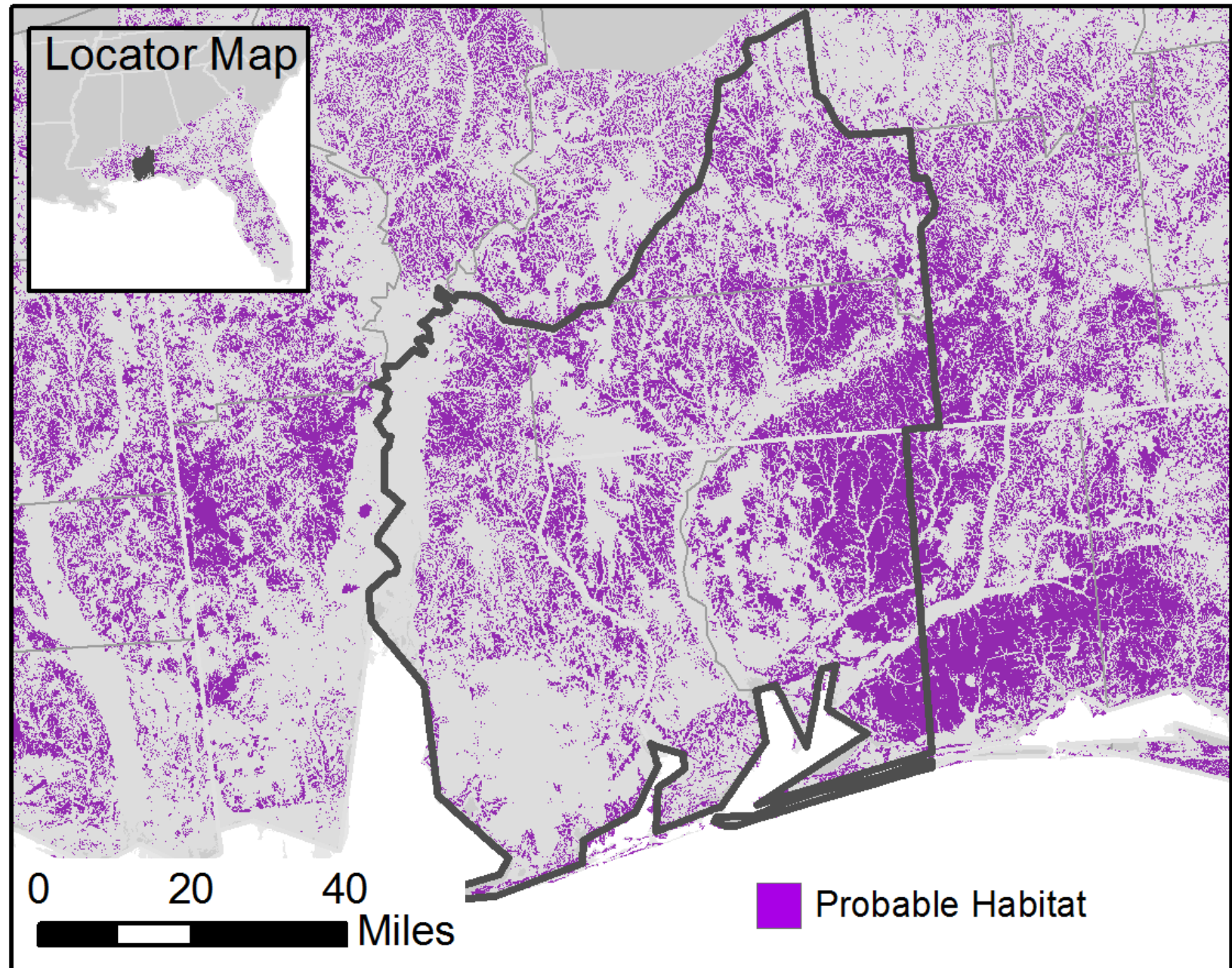


Source: Dr. Brian Crawford, University of Georgia

Gopher Tortoise Species Distribution Model



Percent of SFI Program Participant
Lands Containing Suitable Habitat



Source: University of Georgia

The Map of Biodiversity Importance

A collaborative effort by:



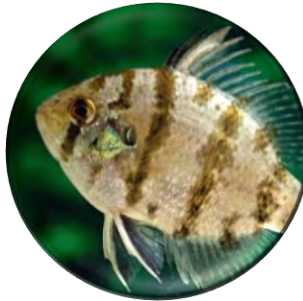
Improved distribution maps for 2,702 G1-G3 & ESA Species



271
Terrestrial
Vertebrates



337
Mussels
and
Crayfish



285
Freshwater &
Anadromous
Fishes

129
Butterflies,
Skippers, &
Bumble
Bees



1,680
Vascular
Plants





Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria

Edited by Lucie M. Bland, David A. Keith, Rebecca M. Miller,
Nicholas J. Murray and Jon Paul Rodríguez

Version 1.1

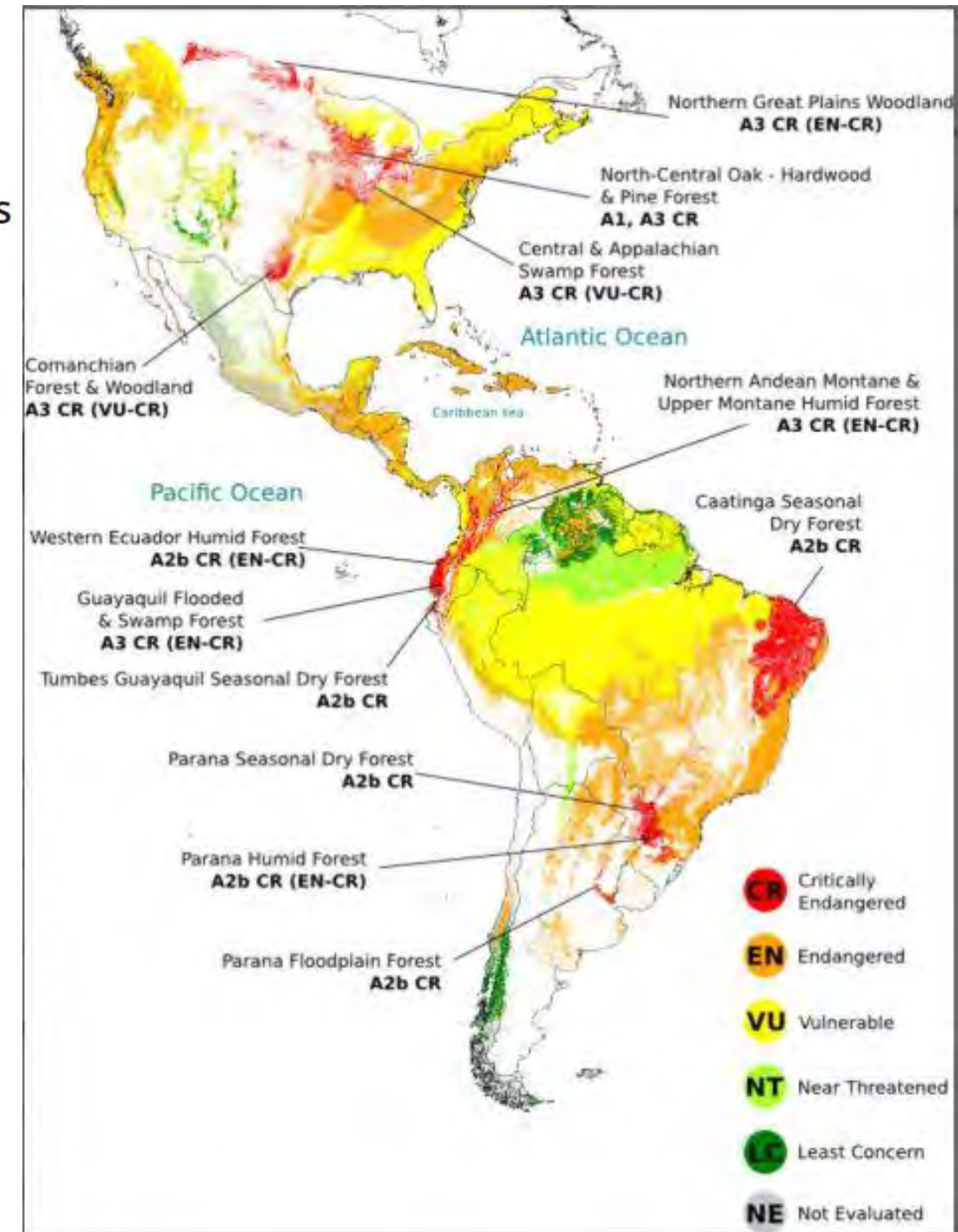


An ecosystem risk assessment of temperate and tropical forests of the Americas with an outlook on future conservation strategies

José Rafael Ferrer-Paris✉, Irene Zager, David A. Keith, María A. Oliveira-Miranda, Jon Paul Rodríguez, Carmen Josse, Mario González-Gil, Rebecca M. Miller, Carlos Zambrana-Torrelío, Edmund Barrow

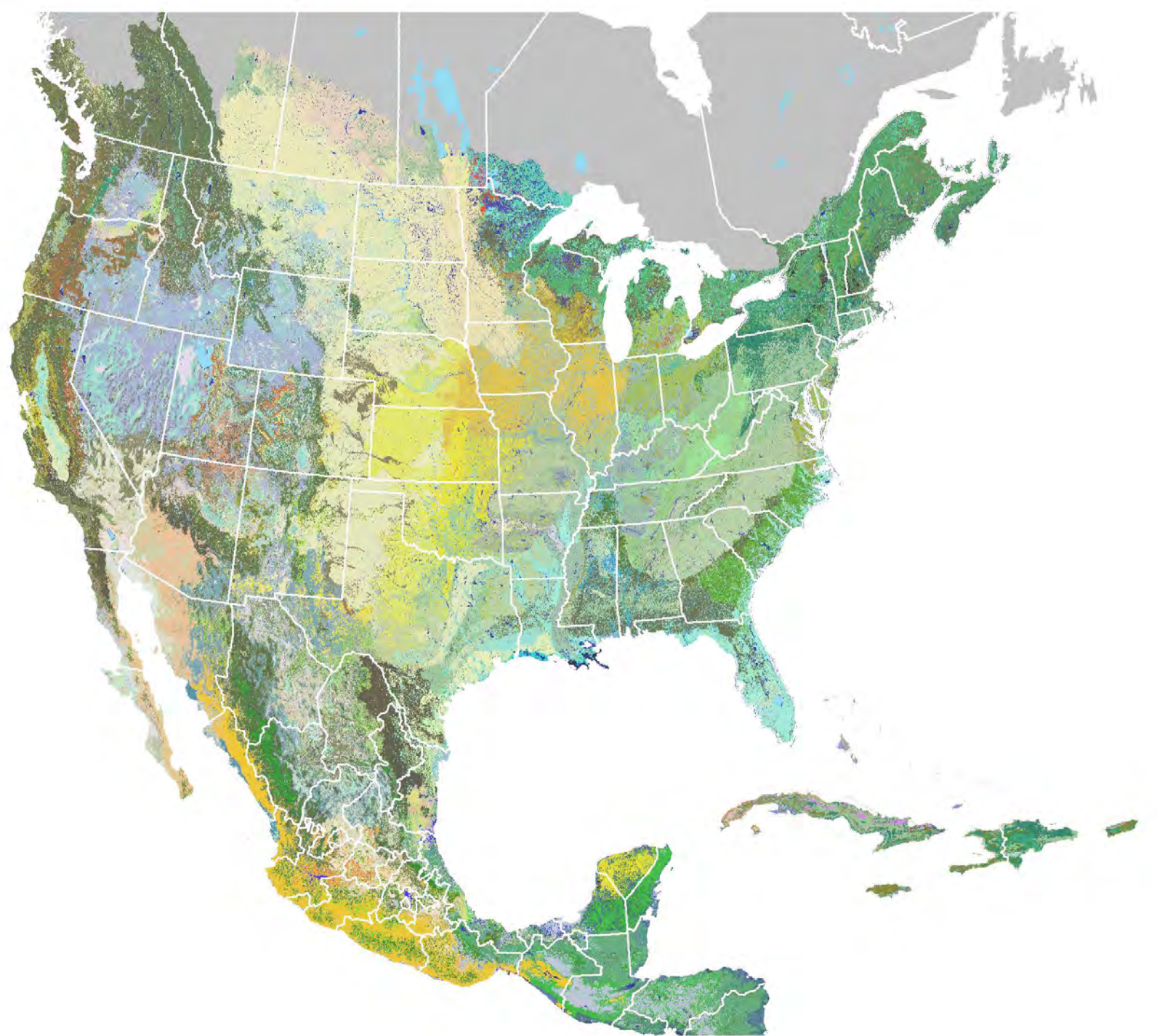
First published: 15 January 2019 | <https://doi.org/10.1111/conl.12623>

The first published IUCN Red List of Ecosystems assessment: Forested areas of the Americas



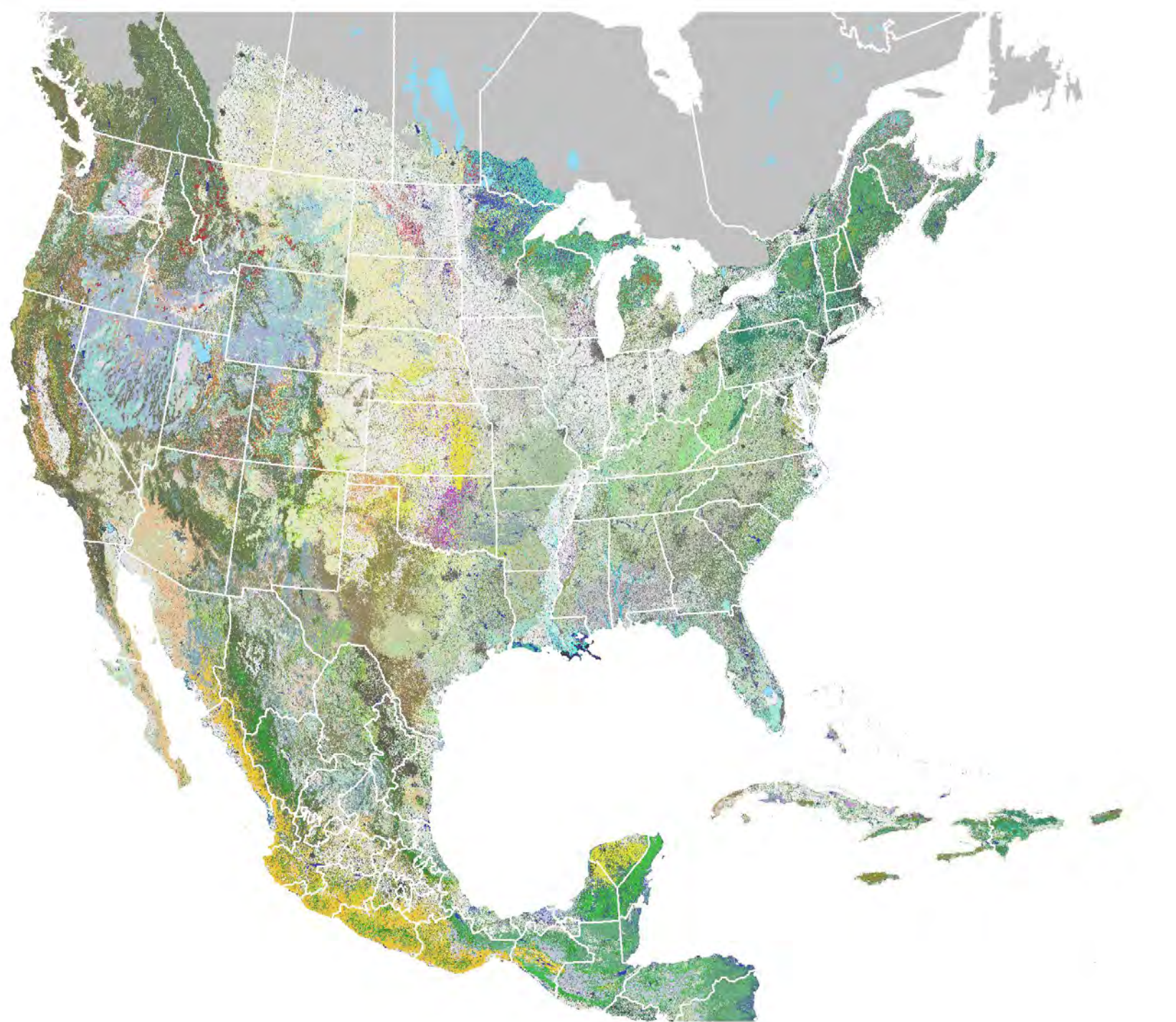
Modeled
Historical
Extent

575
Upland
and
Wetland
Ecosystem
Types



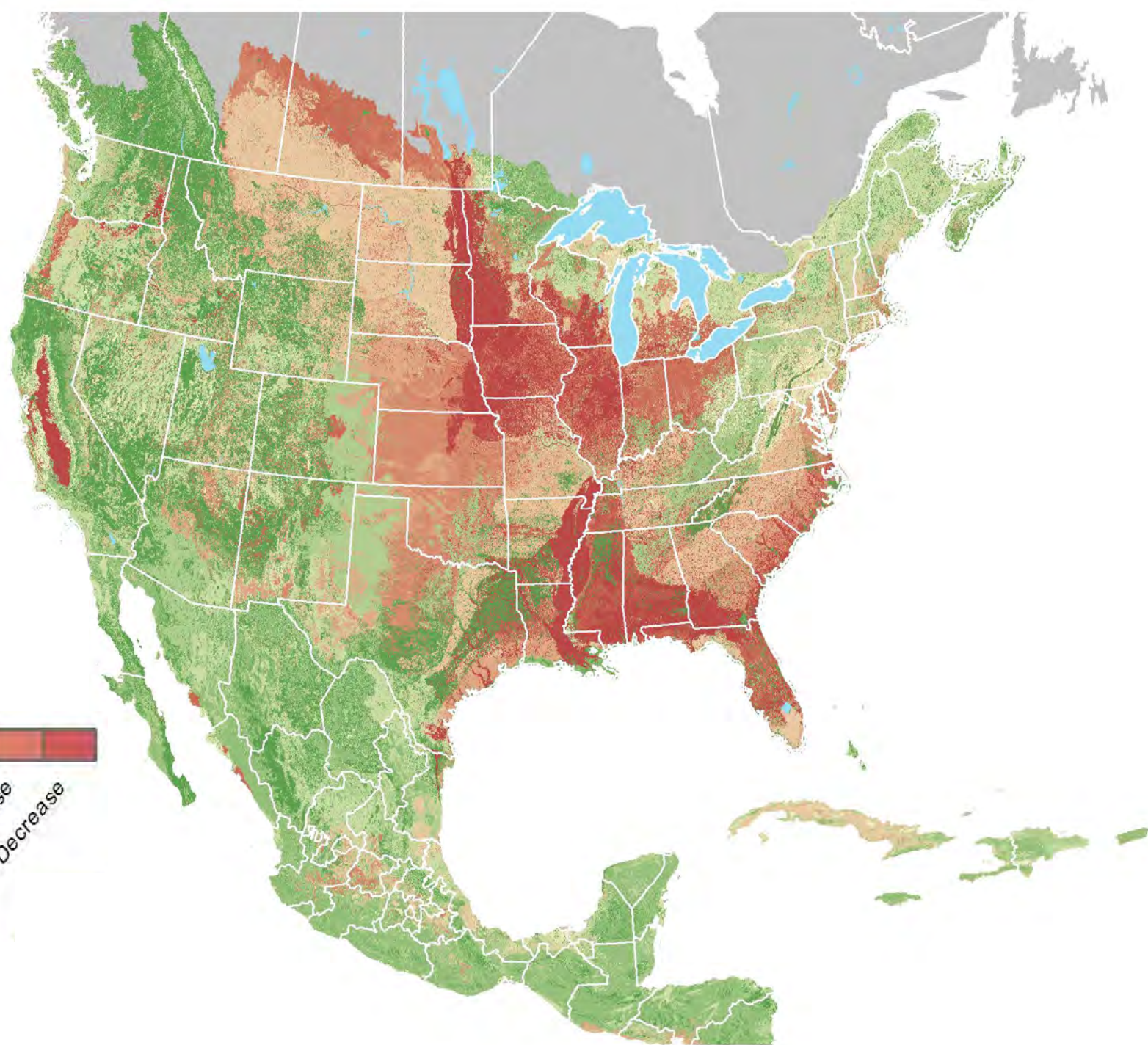
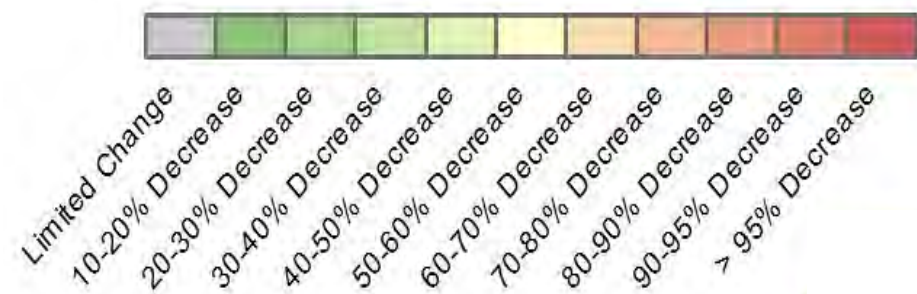
Modeled
Current
Extent

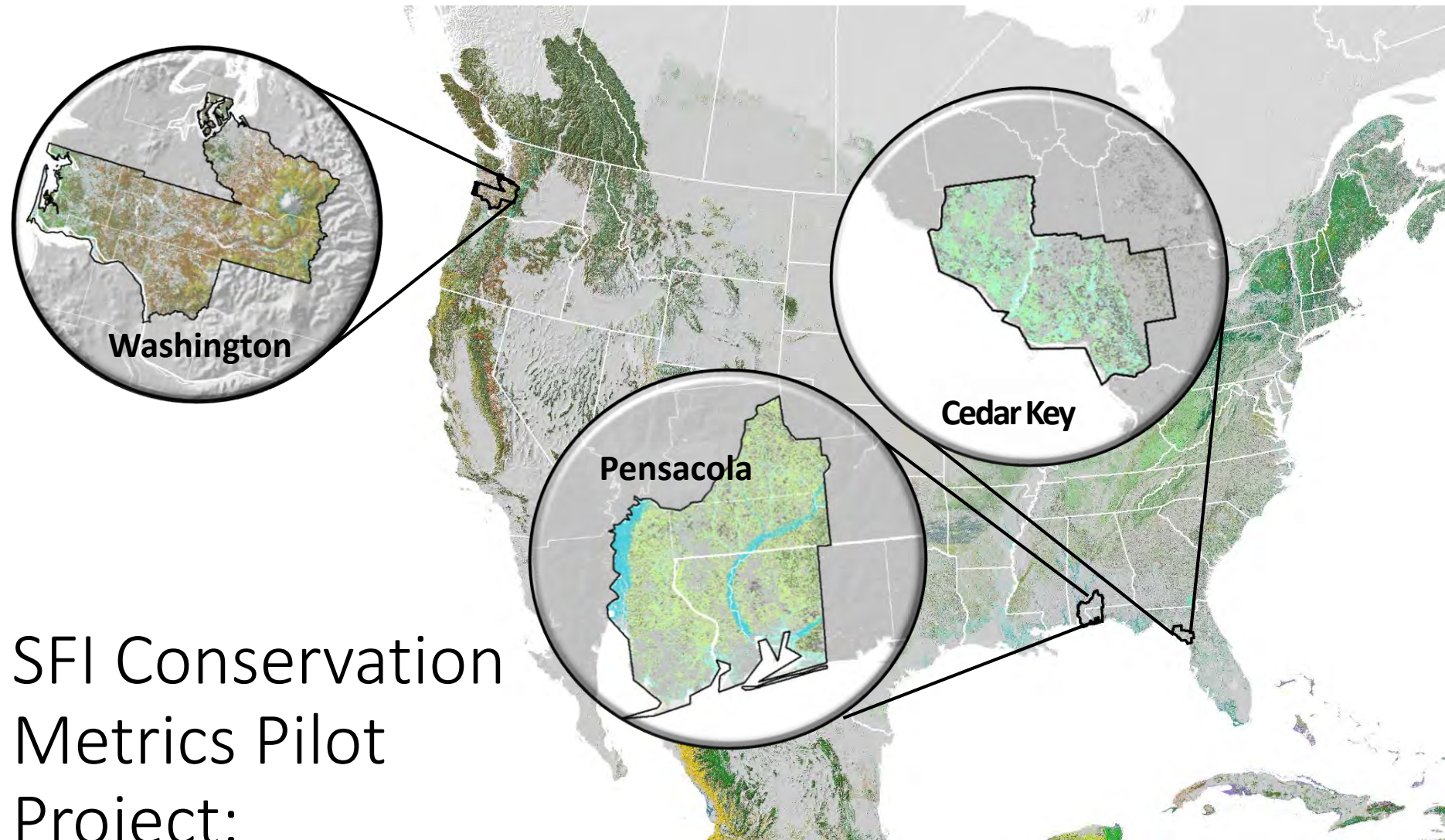
575
Upland
and
Wetland
Ecosystem
Types



Percent Loss Since 1600

575 Upland and Wetland Ecosystem Types





SFI Conservation
Metrics Pilot
Project:
Study Areas



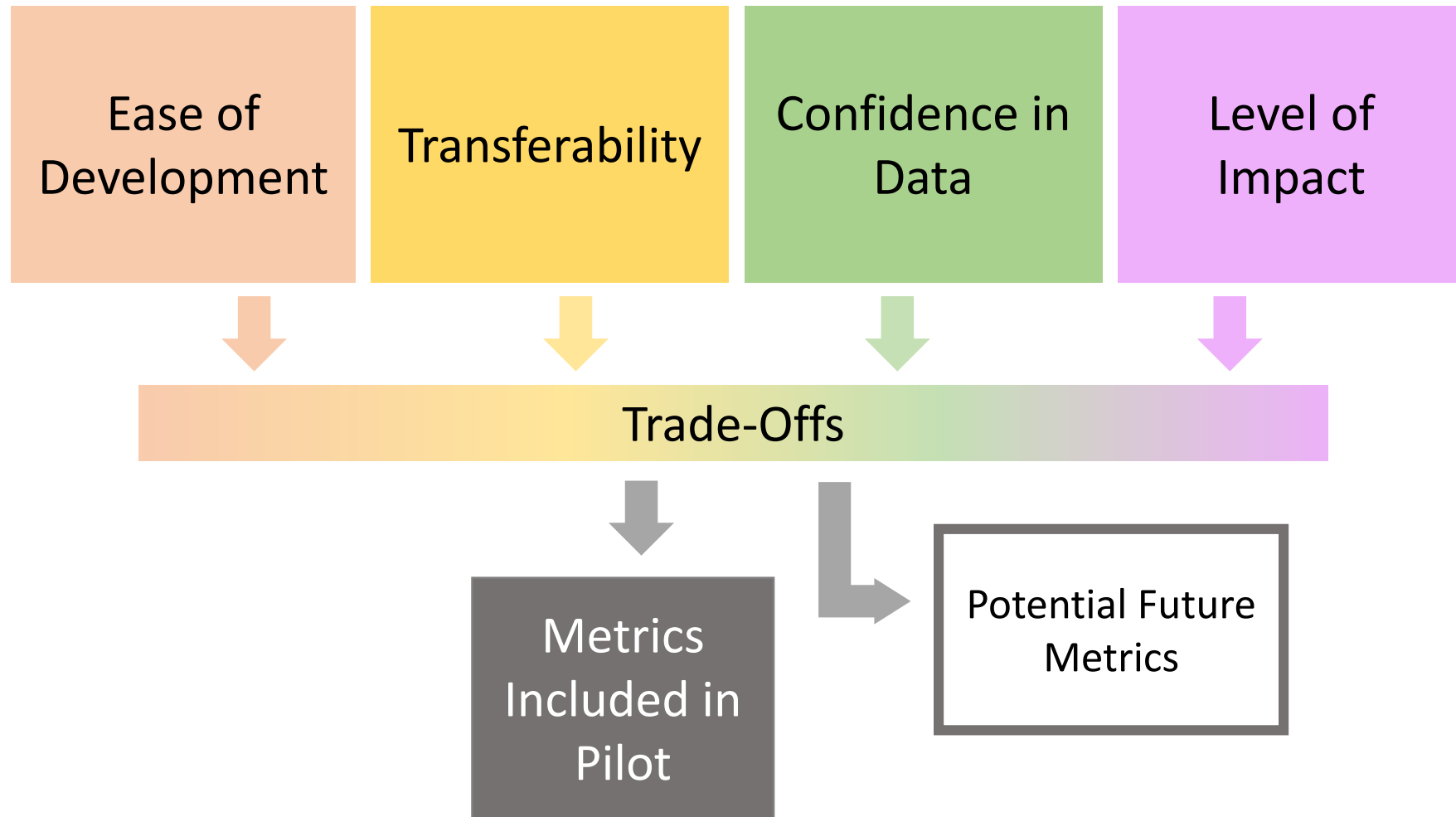
How can we quantify and communicate the biodiversity values of sustainably managed forests?



A Manulife Asset Management Company



Metrics-Based Approach



Species	
Confirmed Occurrence:	Highly Imperiled Species
	Other Species of Concern
Predicted Habitat:	Individual Species
	Species Assemblages

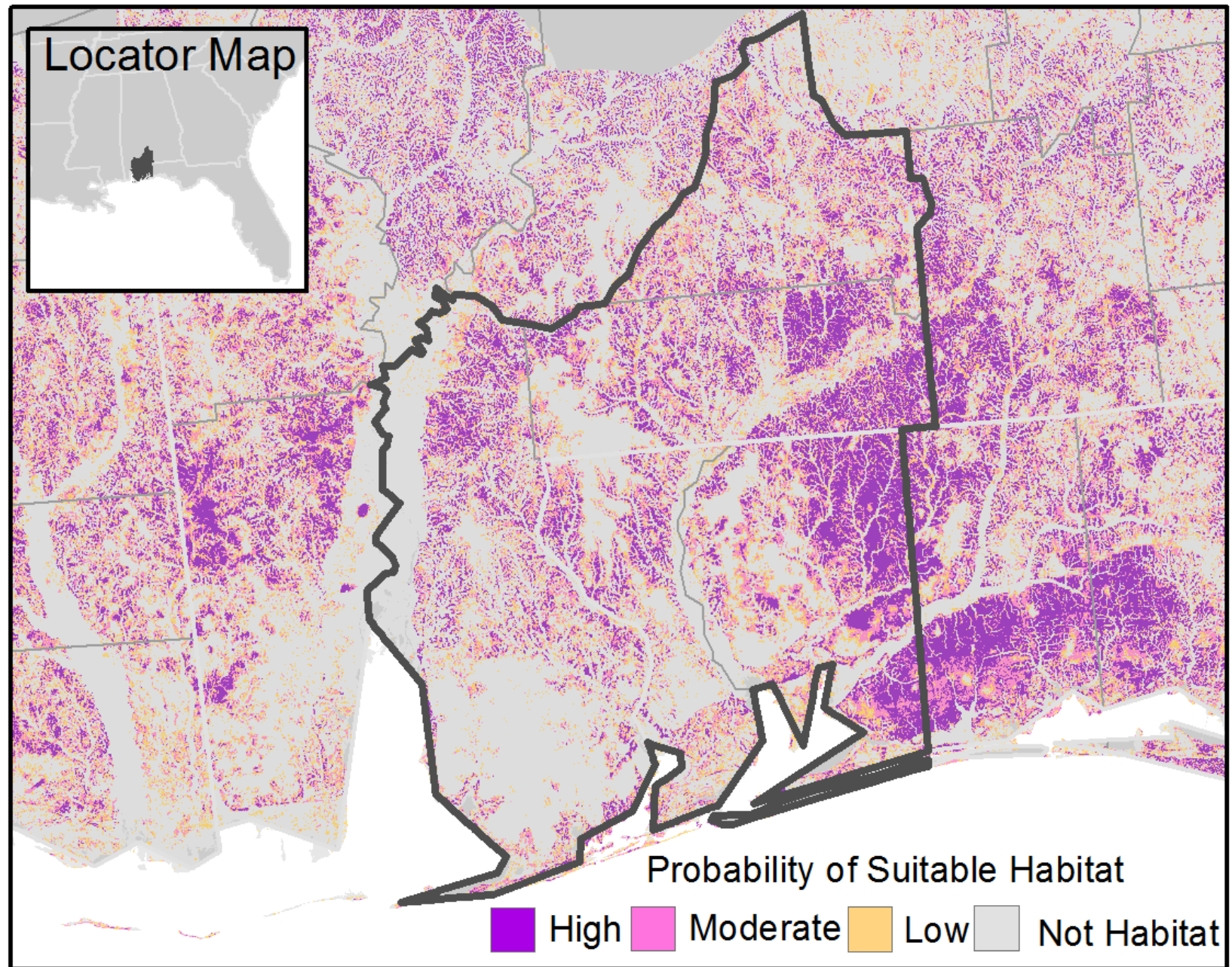
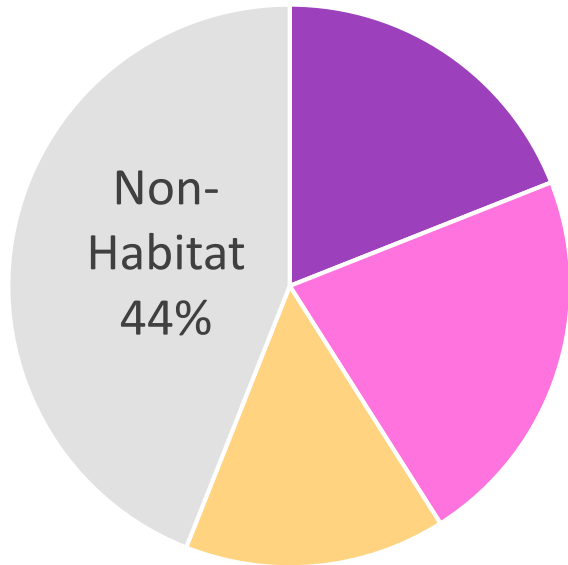
Ecosystems	
Highly Imperiled Communities	Ecological Systems

Metric Families

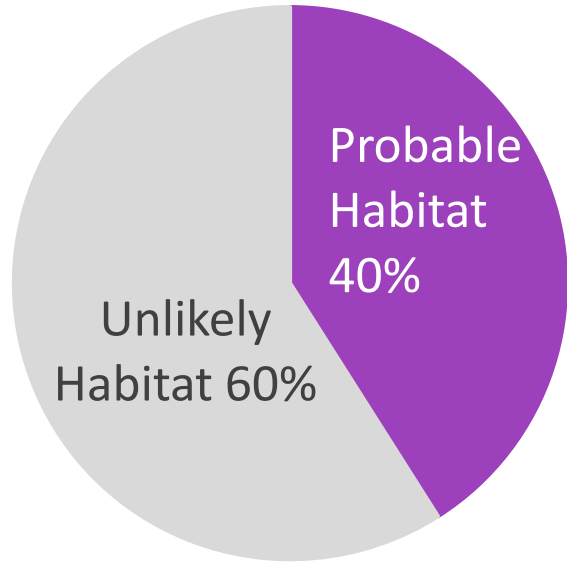
Landscape Metrics		
Landscape Condition	Landscape Spatial Pattern	Habitat Connectivity
Regional Conservation Goals		
Contributions to region-specific conservation priorities		



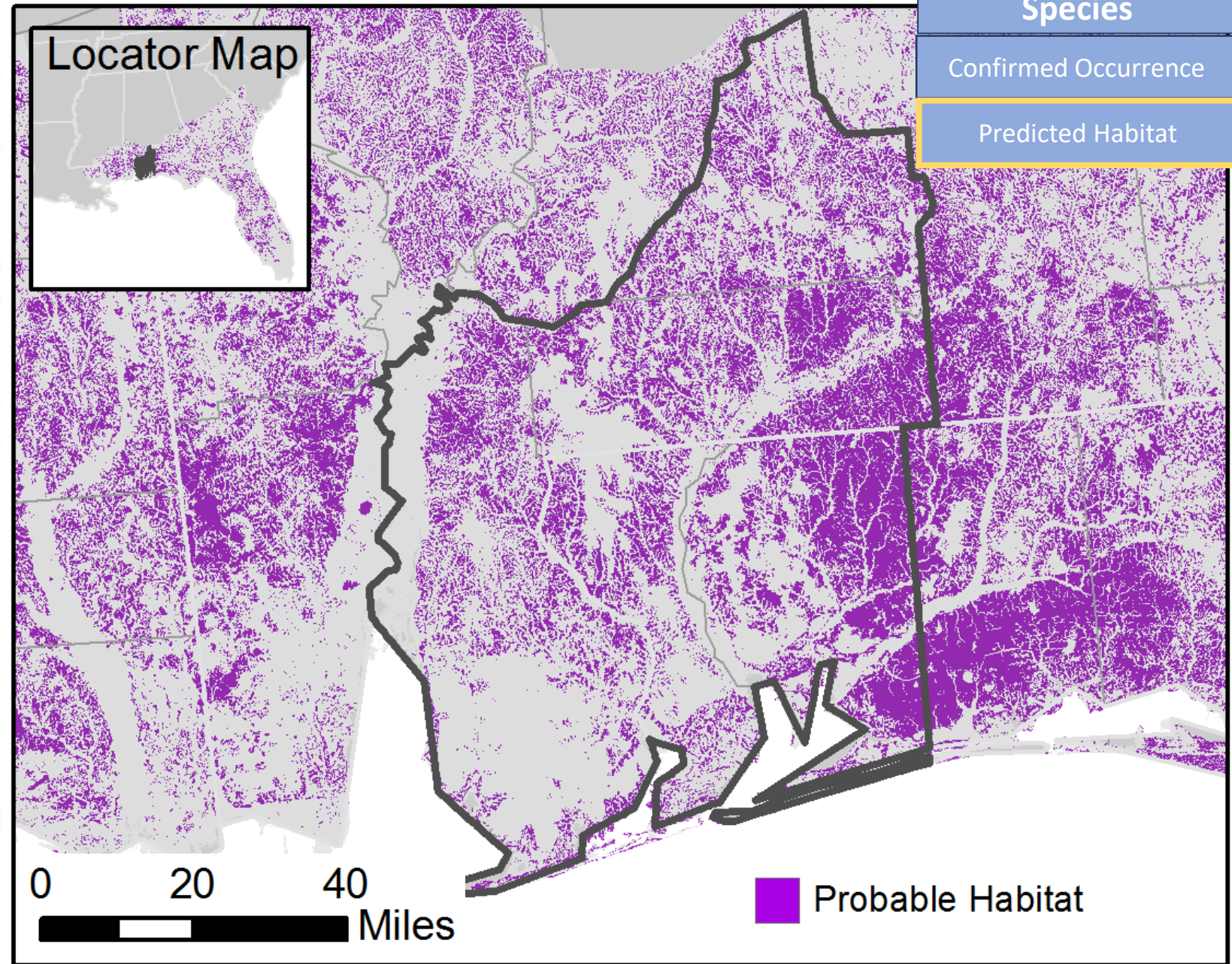
Gopher Tortoise Species Distribution Model



Source: Dr. Brian Crawford, University of Georgia



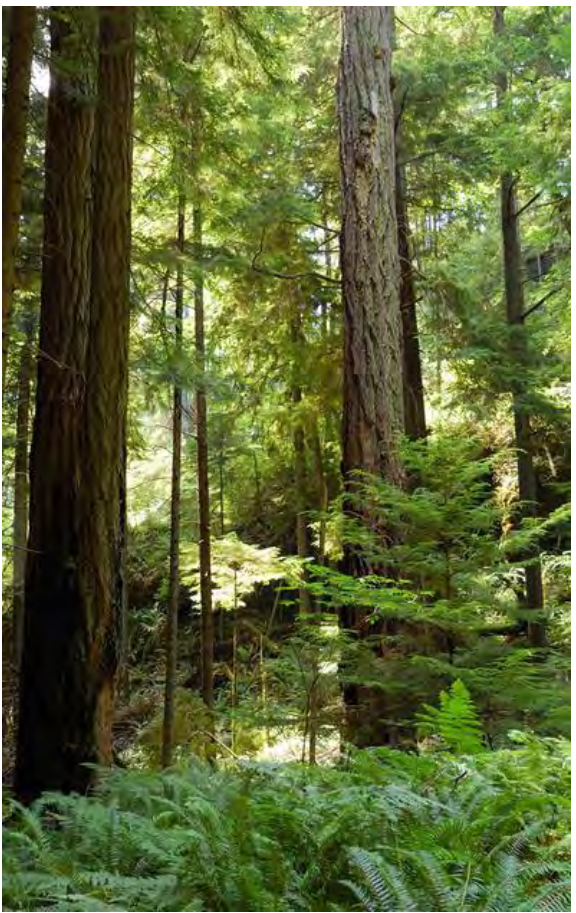
**Metric: Percent of SFI
Program Participant
Lands Containing Probable
GT Habitat**



Source: University of Georgia

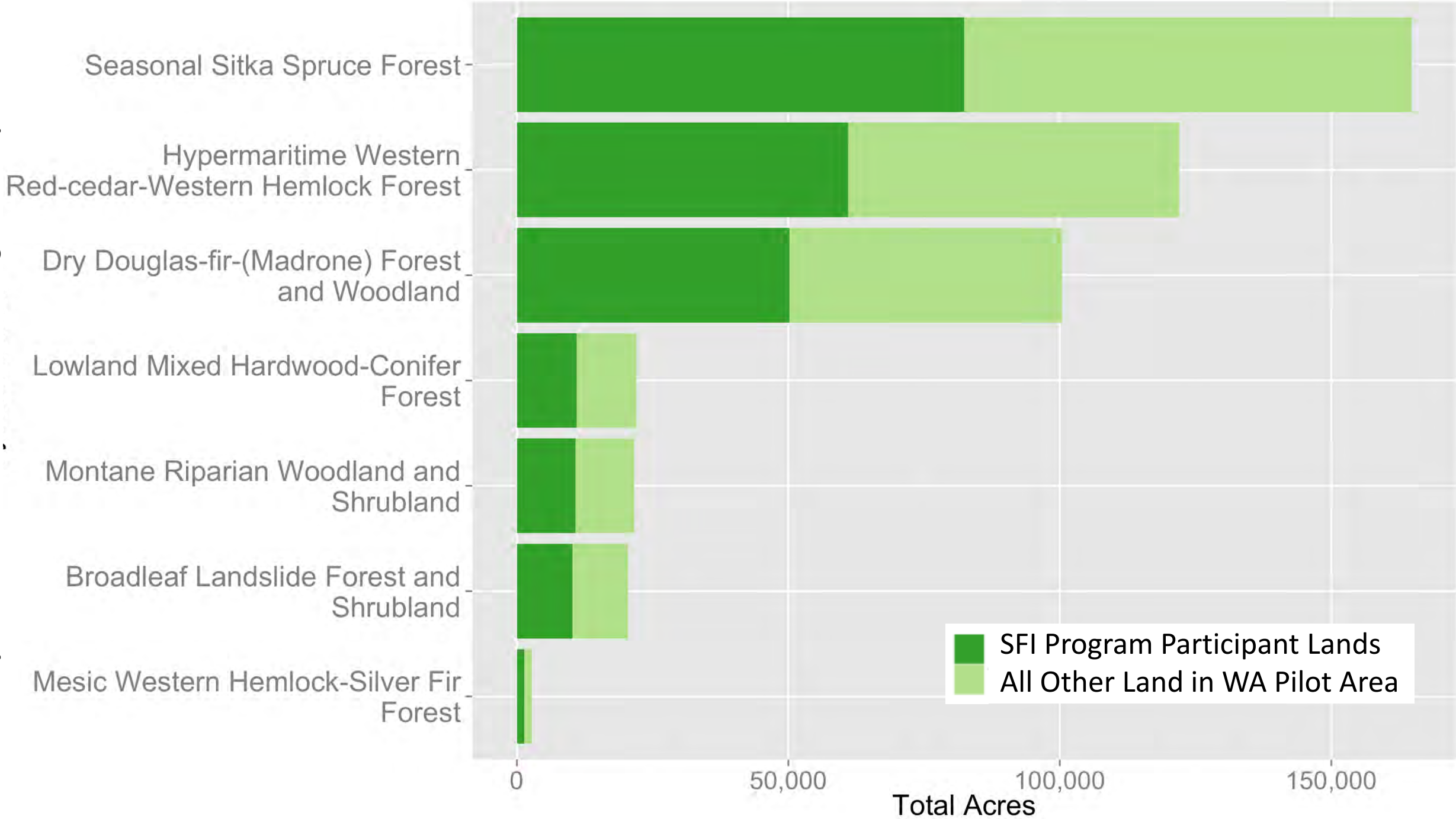
Ecological System (North Pacific)	Acres on SFI Program Participant lands
Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest	444,200
Maritime Dry-Mesic Douglas-fir-Western Hemlock Forest	142,800
Dry-Mesic Silver Fir-Western Hemlock-Douglas-fir Forest	71,900
Lowland Riparian Forest and Shrubland	32,400
Seasonal Sitka Spruce Forest	24,700
Hypermaritime Western Red-cedar-Western Hemlock Forest	19,500
Dry Douglas-fir-(Madrone) Forest and Woodland	7,200
Broadleaf Landslide Forest and Shrubland	3,300
Shrub Swamp	2,500
Montane Riparian Woodland and Shrubland	2,000
Lowland Mixed Hardwood-Conifer Forest	1,700
Hardwood-Conifer Swamp	1,500
Temperate Pacific Freshwater Emergent Marsh	1,000
Montane Shrubland	900
Mesic Western Hemlock-Silver Fir Forest	400

Ecosystems	
Highly Imperiled Communities	Ecological Systems



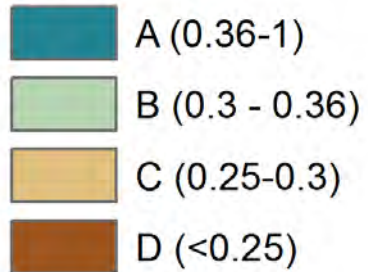
North Pacific Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest

Photo | Joe Rocchio

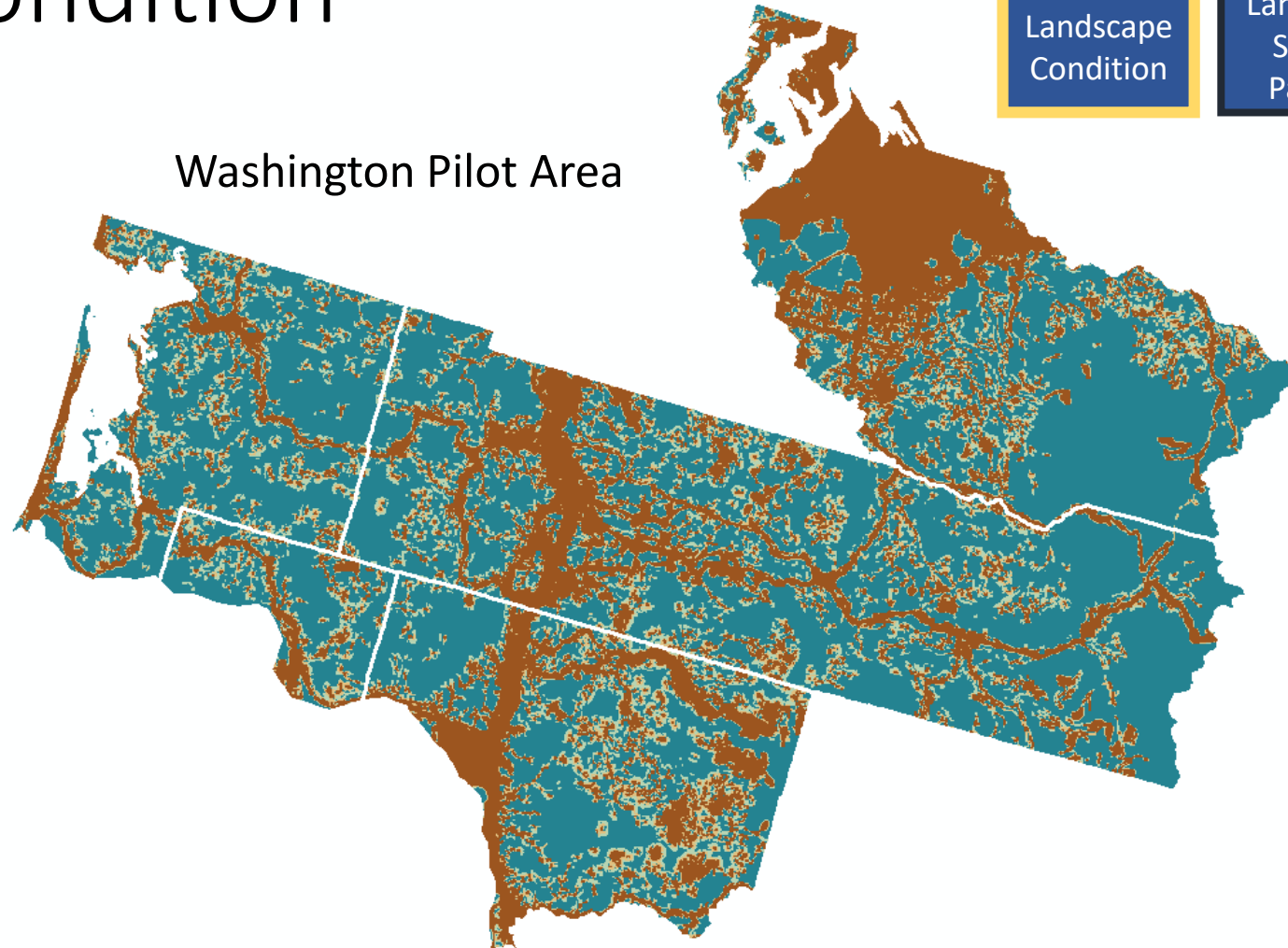


Landscape Condition

Landscape Condition Value



Washington Pilot Area



Landscape Metrics

Landscape
Condition

Landscape
Spatial
Pattern

Habitat
Connectivity

Modeling landscape condition for biodiversity assessment – application in temperate North America

Hac, JC and PJ Comer, Ecological Indicators 2017 Vol. 82 pp 206-216

Landscape Spatial Pattern

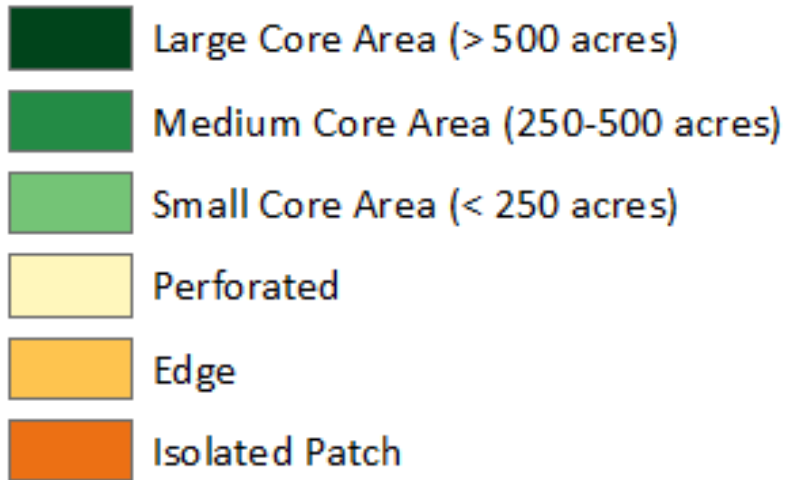
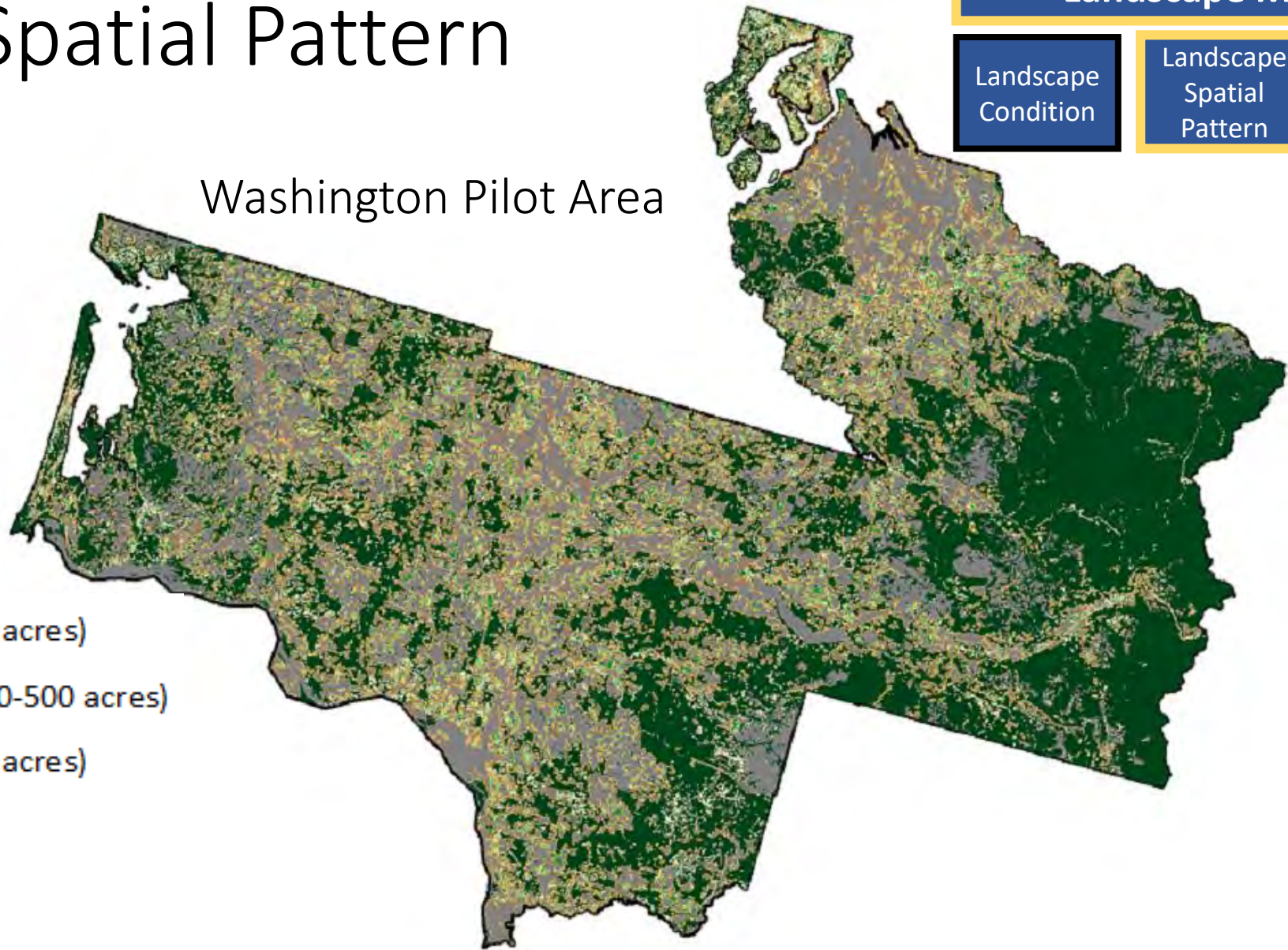
Landscape Metrics

Landscape
Condition

Landscape
Spatial
Pattern

Habitat
Connectivity

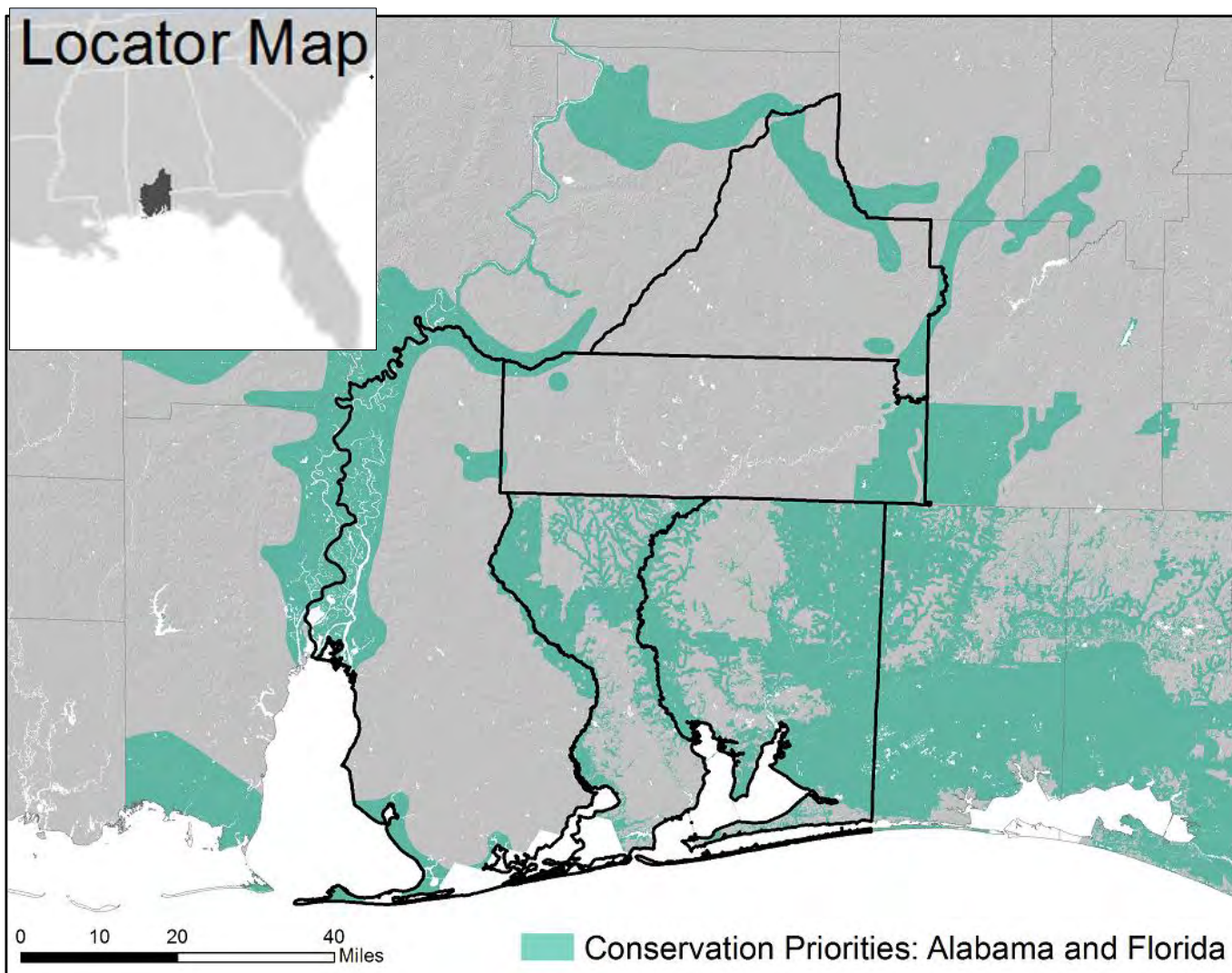
Washington Pilot Area



Contribution to Conservation Goals: State Wildlife Action Plan Priorities

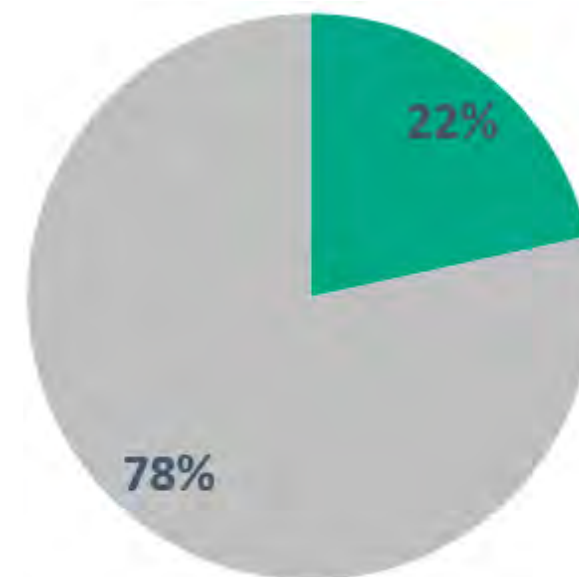
Regional Conservation Goals

Contributions to region-specific
conservation priorities



SFI Program Participant Lands
Overlapping with
AL and FL SWAP Priorities:

Pensacola Pilot Area

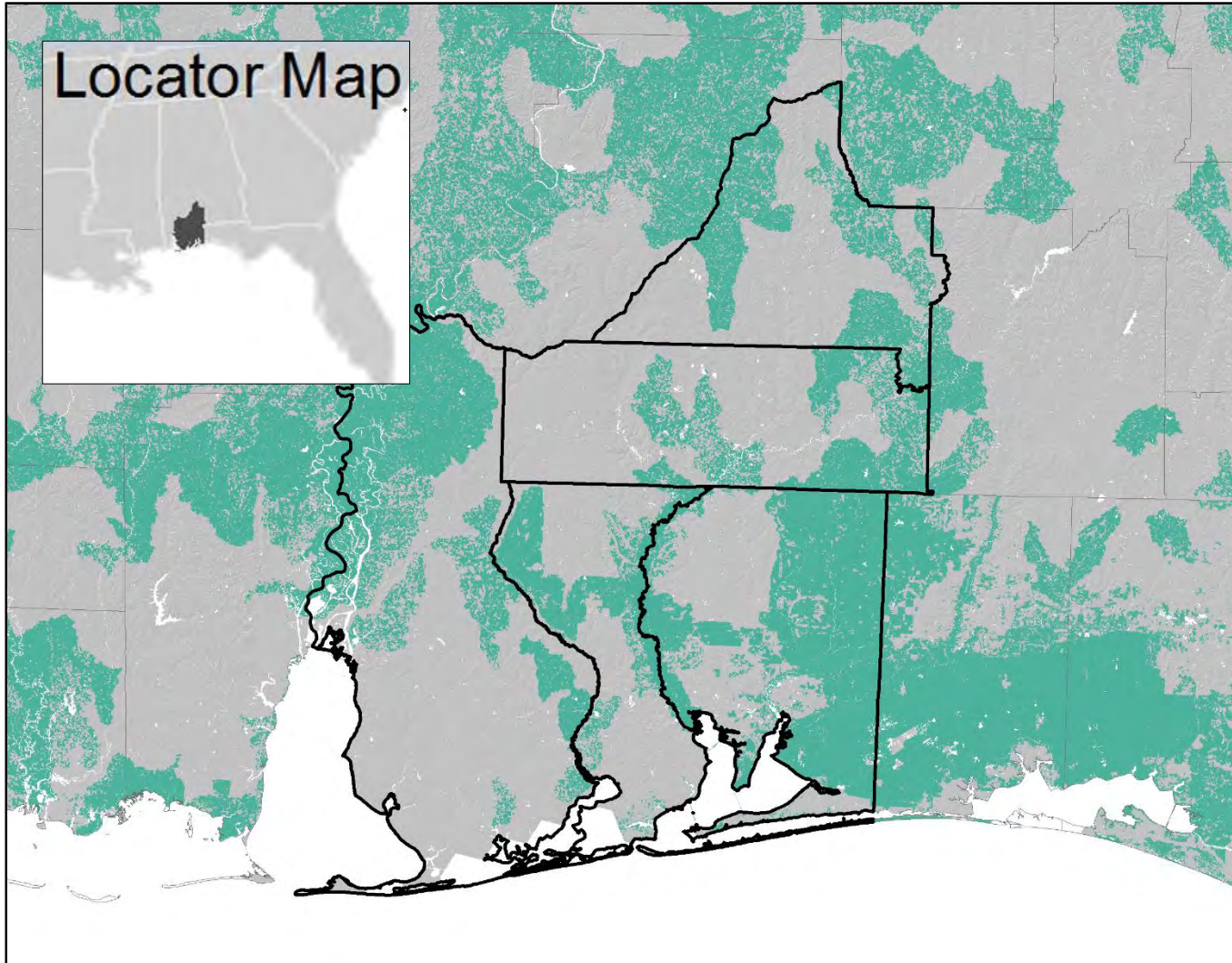


Acres of Overlap: 92,600

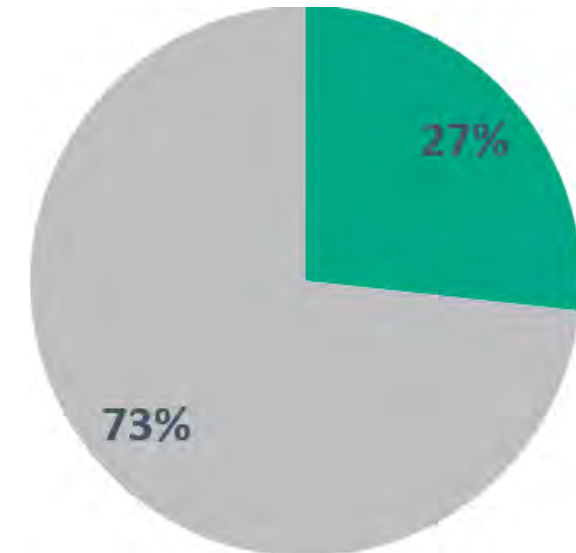
Regional Conservation Goals

Contributions to region-specific
conservation priorities

Contribution to Conservation Goals: Southeast Conservation Adaptation Strategy Priorities



SFI Program Participant Lands
Overlapping with
SECAS Priorities:
Pensacola Pilot Area



Acres of Overlap: 122,800

Within pineland areas of the Coastal Plain, including intensively managed loblolly stands, you may find scattered small seasonal or temporary wetlands that contain standing water for some or most of the year.



Top, center, & above
© Alan Cressler

At first glance, these wetlands may not appear to be important, but their presence often means habitat for a suite of unique (and sometimes rare) animals and plants.

Identifying & Understanding Ephemeral Isolated Wetlands in the Coastal Plain

Management Notes

Locating and mapping ecologically significant wetlands within intensively managed pinelands—and protecting them from mechanical site preparation—can benefit some species of high conservation priority. Methods now exist to identify likely locations of isolated wetlands using remotely sensed data.



© Rob Sheppard

When using prescribed fire, consider allowing fire to burn through the Coastal Plain Streamheads and Depression Ponds to improve these wetland habitats and reduce shrubby vegetation. It is better to avoid plowing firebreaks along the edge, and avoid pushing and piling the logging slash into these small peripheral wetland areas.

Keeping heavy equipment out of these wetlands will protect soils from compaction and protect equipment from getting stuck.

Additional Resources

Sustainable Forestry Initiative www.sfiprogram.org

Longleaf Alliance www.longleafalliance.org

Stewardship of Longleaf Pine Forests: A Guide for Landowners j.mp/CU-Forests

Landowners Guide to Forestry in South Carolina j.mp/SCForests

Biodiversity Values of Geographically Isolated Wetlands in the United States j.mp/NS-wetlands



© Alan Cressler

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A Network Connecting Science With Conservation

with support of
ncasi



© Alan Cressler

How do you recognize an isolated wetland of conservation value?

Isolated ephemeral wetlands support unusual or rare plants and animals. Such ponds can vary widely in how they look and where they appear on the landscape. For instance, they may be dominated by large pond-cypress trees, or they may be shrubby, or they may be open with lily-pads or widely space clumps of grasses.

In spite of such differences, they all dry out, at least in some years, which is what distinguishes these ephemeral habitats from other wetland types. Their ephemeral nature is not hospitable to predatory fish that eat amphibian larva.

What plants and animals call these wetlands home?

Isolated ephemeral wetlands in the Coastal Plain support a wide variety of unique plants and animals. Notably, numerous species of amphibians rely on these ponds for breeding and larval development.

Frosted flatwoods salamanders (*Ambystoma cingulatum*), **Carolina gopher frogs** (*Rana capito capito*), and **striped newts** (*Notophthalmus peristriatus*) are three particularly distinctive amphibians that rely on these communities for survival. But these species are just a few of the unique amphibians, birds, mammals, reptiles, dragonflies, and plants associated with ephemeral ponds, especially those without predatory fishes.



Striped newt
Matt Pierson



Frosted flatwoods salamander
© Michael Graziano

In addition, a number of interesting species of plants call this community home, including beakrushes, yellow-eyed grass, pitcher plants, orchids, and meadow beauties. Species notable for their rarity that occur in ephemeral wetlands include

- **awned meadowbeauty** (*Rhexia aristosa*)
- **Canby's dropwort** (*Oxypolis canbyi*)
- **pondberry** (*Lindera melissifolia*)



Pondberry
(*Lindera melissifolia*)
© Alan Cressler



Awned meadowbeauty
(*Rhexia aristosa*)
© Milo Pyne



Carolina gopher frog
Matt Pierson

Maps and tools are readily available – tablets and handheld devices can support those in the field

File Edit View History Bookmarks Tools Help

SFI Conservation Value Metrics X Go to

LandScope America

INTRODUCTION EXPLORE PLACES & TOPICS FOCUS & PLAN TAKE ACTION CONNECT & SHARE GO TO THE MAP

Theme Conservation Priorities Map Layers Save Share Map Reports Identify Draw Measure

Legend

- [The Nature Conservancy's Priority Conservation Areas](#)
- [Critical Watersheds for Freshwater Species](#)
- [North American Grassland Priority Conservation Areas](#)
- [State Wildlife Action Plans](#)

Alabama

31.6 -84.53

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Funding the Shared Natural Wealth
Managing for Priority Wildlife on A...
Conserving Mississippi's Alligator ...
Restoring and Conserving Sandhill ...
Improving Habitat for Imperiled WL...
Restoring Bog Turtles and Wetlands

NatureServe. NATIONAL GEOGRAPHIC

Global Forest Change

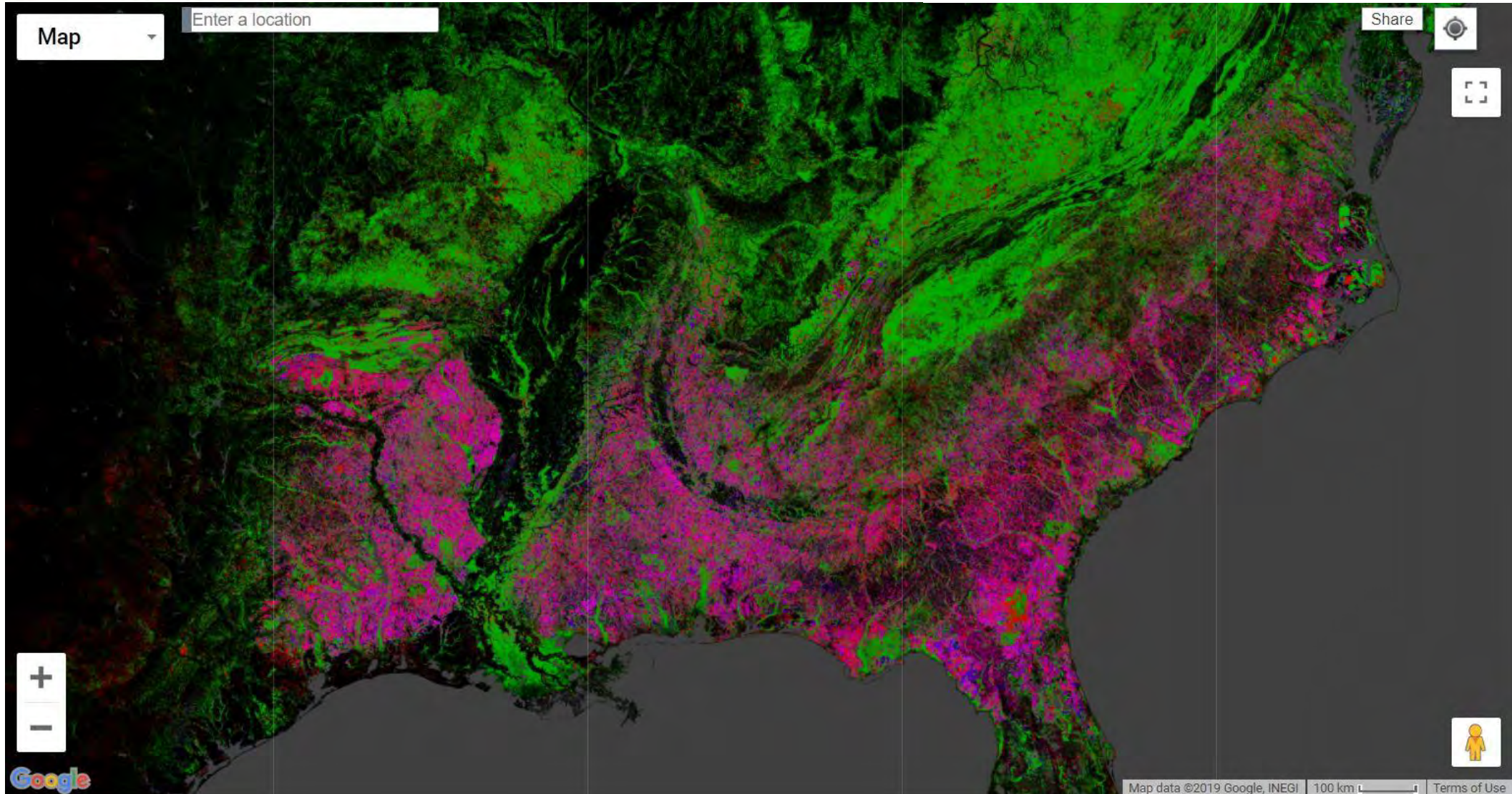
Published by Hansen, Potapov, Moore, Hancher et al.



UNIVERSITY OF
MARYLAND
DEPARTMENT OF GEOGRAPHICAL SCIENCES

Legend

- Forest Loss 2000–2018
- Forest Gain 2000–2012
- Both Loss and Gain
- Forest Extent





Thank you

healy_hamilton@natureserve.org
www.natureserve.org